

Sheet (1)

Set of Rational Numbers (Q)

- The set of counting numbers $C = \{1, 2, 3, 4, \dots\}$
- The set of natural numbers $N = \{0, 1, 2, 3, 4, \dots\}$
- The set of integer numbers $Z = \{0, \pm 1, \pm 2, \pm 3, \pm 4, \dots\}$
- The set of rational numbers: the set contains the numbers can be written as a fraction and its denoted by Q, this fraction whose numerator is an integer and whose denominator is an integer except zero because (division by zero meaningless)

$$Q = \left\{ x : x = \frac{a}{b}, a \in Z, b \in Z, b \neq 0 \right\}$$

[1] Show which of the following number is rational and which is irrational:

(a) $\frac{2}{3}$

(b) zero

(c) 6.5

(d) - 1.8

(e) $5\frac{1}{6}$

(f) $-\frac{5}{3}$

(g) $-\frac{2}{3}$

(h) $\frac{2-2}{3}$

(i) $\frac{4}{5-5}$

(j) 3^2

(k) $(-4)^{\text{zero}}$

(l) 13%

[2] Show which of the following numbers is integer:

(a) $\frac{15}{5}$

(b) $\frac{4}{8}$

(c) $\frac{-35}{7}$

(d) $-\frac{14}{14}$

(e) $-\frac{24}{5}$

(f) $\frac{0}{5}$

(g) $3\frac{1}{4}$

(h) $\frac{3-3}{5}$

[3] Solve the following equations:

(1) $2x = 0$

(2) $4x = 0$

(3) $x - 3 = 0$

(4) $x + 3 = 0$

(5) $4 - x = 0$

(6) $x - 4 = 0$

[4] Complete:

(1) If $\frac{5}{a}$ is a rational number, then $a \neq \dots\dots$

(2) The number $\frac{3}{x-2}$ is a rational number if $x \neq \dots\dots$

(3) The number $\frac{x+7}{x-3} \in \mathbb{Q}$ if $x \neq \dots\dots$

(4) The number $\frac{x+7}{x-3} \notin \mathbb{Q}$ if $x = \dots\dots$

(5) The number $\frac{2}{5x}$ is a rational number if $x \neq \dots\dots$

(6) The rational number $\frac{4-x}{x-9} = 0$ if $x = \dots\dots$

(7) The rational number $\frac{x+5}{x-9} = 0$ if $x = \dots\dots$

[5] Complete the following table:

The number	$\frac{5}{x-3}$	$\frac{3}{4-x}$	$\frac{7}{8x}$	$\frac{6x}{x}$
Expresses a rational no. if $x \neq \dots\dots$	$\dots\dots$	$\dots\dots$	$\dots\dots$	$\dots\dots$

[6] Complete the following table:

The rational number	$\frac{x-2}{x-1}$	$\frac{6-x}{x-4}$	$\frac{2x}{x+5}$	$\frac{2x-4}{x+3}$
Equals to zero if $x = \dots\dots$	$\dots\dots$	$\dots\dots$	$\dots\dots$	$\dots\dots$

[7] Write each rational number in the form $\frac{a}{b}$:

(1) - 5

(2) zero

(3) 0.75

(4) - 0.01

(5) 5.4

(6) 30%

(7) 4.5%

(8) $8\frac{2}{3}$

[8] Which of the following numbers can be written as a terminating decimal?

(1) $\frac{7}{15}$

(2) $\frac{-7}{20}$

(3) $\frac{-8}{9}$

(4) $-1\frac{2}{9}$

(5) $\frac{17}{6}$

(6) $\frac{5}{11}$

(7) $\frac{5}{8}$

(8) $\frac{13}{22}$

(9) $2\frac{2}{5}$

(10) $-1\frac{2}{3}$

[9] Write each rational number as a decimal and a percentage:

The number	The decimal form	The percentage form
(1) $\frac{1}{4}$		
(2) $2\frac{1}{2}$		
(3) $\frac{21}{1000}$		
(4) $\frac{1}{6}$		
(5) $-\frac{3}{20}$		
(6) $7\frac{3}{16}$		

[10] Put each of the following numbers in the simplest form:

(1) $\frac{15}{35}$

(2) $\frac{-24}{56}$

(3) $\frac{45}{60}$

(4) $\frac{-132}{88}$

(5) $\frac{33}{55}$

(6) $\frac{36}{48}$

[11] Complete:

(1) $\frac{2}{3} = \frac{4}{\dots} = \frac{\dots}{12} = \frac{\dots}{\dots}$

(2) $\frac{4}{5} = \frac{8}{\dots} = \frac{\dots}{20} = \frac{\dots}{\dots}$

(3) $6 = \frac{12}{\dots} = \frac{\dots}{3} = \frac{\dots}{\dots}$

(4) $5 = \frac{35}{\dots} = \frac{\dots}{4} = \frac{\dots}{\dots}$

[12] Choose the correct answer:

- (1) If $\frac{4}{5} = \frac{20}{x}$, then $x = \dots\dots$
 (a) 25 (b) -25 (c) 5 (d) 100
- (2) The number $\frac{a-6}{a-4}$ is not rational number if $a = \dots\dots$
 (a) 6 (b) 4 (c) 1 (d) zero
- (3) The rational number $\frac{a}{b}$ is an integer if
 (a) $a < b$ (b) $a > b$
 (c) b is a divisor of a (d) a is a divisor of b
- (4) $0.\dot{5}\dot{7} = \dots\dots$
 (a) $\frac{57}{100}$ (b) $\frac{57}{99}$ (c) $\frac{575}{1000}$ (d) $\frac{19}{33}$
- (5) $|- \frac{8}{25}| = \dots\dots$
 (a) $- \frac{8}{25}$ (b) $- 0.3\dot{2}$ (c) $- 0.\dot{3}\dot{2}$ (d) 32%
- (6) $12\% = \dots\dots$
 (a) $0.\dot{3}$ (b) 1.2 (c) $\frac{3}{25}$ (d) 0.012
- (7) The rational number $\frac{x}{-3}$ is negative if
 (a) $x > \text{zero}$ (b) $x < \text{zero}$ (c) $x \leq \text{zero}$ (d) $x = \text{zero}$
- (8) If $\frac{a}{b}$ is a rational number and $a \neq 0$, then
 (a) $a = 0$, $b \neq \text{zero}$ (b) $a \neq 0$, $b \neq \text{zero}$
 (c) $a = 0$, $b = \text{zero}$ (d) $a \neq 0$, $b = \text{zero}$



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Sheet (2)

Comparing and Ordering Rational Numbers

[1] Complete using (<), (>) or (=):

① $\frac{2}{3}$ ○ $\frac{1}{3}$

⑤ $\frac{2}{3}$ ○ $\frac{4}{5}$

⑨ $-4\frac{1}{2}$ ○ -5

② $\frac{4}{5}$ ○ $\frac{3}{5}$

⑥ $\frac{1}{2}$ ○ zero

⑩ $4\frac{1}{2}$ ○ 5

③ $\frac{4}{9}$ ○ 1

⑦ $-\frac{1}{2}$ ○ zero

⑪ $|\frac{-15}{2}|$ ○ $7\frac{1}{2}$

④ $\frac{1}{2}$ ○ $\frac{1}{4}$

⑧ $-\frac{3}{4}$ ○ $\frac{1}{4}$

⑫ $|\frac{-3}{2}|$ ○ $\frac{1}{2}$

[2] Put the suitable sign using (<), (>) or (=):

① $\frac{1}{4}$ ○ $\frac{1}{6}$

③ $\frac{9}{5}$ ○ $1\frac{2}{3}$

⑤ 0.5 ○ $\frac{2}{8}$

② $-\frac{5}{7}$ ○ $-\frac{3}{2}$

④ $-3\frac{1}{2}$ ○ $-\frac{20}{6}$

⑥ 1.6 ○ $|\frac{-8}{5}|$

[3] Arrange the following rational numbers in a descending order:

$\frac{3}{10}$, $\frac{7}{30}$, $-\frac{1}{3}$, $-\frac{1}{5}$ and $\frac{4}{15}$

[4] Arrange the following rational numbers in an ascending order:

$\frac{3}{4}$, $-\frac{5}{8}$, $-\frac{7}{12}$ and $\frac{2}{3}$

[5] Write a rational number in each of the following:

① $\frac{2}{5} < \dots < \frac{3}{5}$

③ $-\frac{2}{7} < \dots < -\frac{3}{14}$

② $-\frac{2}{3} < \dots < -\frac{1}{3}$

[6] Write two rational numbers lying between:

(1) $\frac{1}{2}$ and $\frac{4}{5}$

(2) $-\frac{3}{4}$ and $-\frac{2}{3}$

(3) 0.3 and $\frac{3}{5}$

(4) $\frac{2}{5}$ and $\frac{3}{5}$

(5) $\frac{1}{8}$ and $\frac{1}{4}$

[7] Write four rational numbers lying between:

(1) $\frac{1}{2}$ and $\frac{11}{12}$

(2) $-\frac{4}{9}$ and $-\frac{5}{6}$

(3) Zero and 3

[8] If $a = 3$ and $b = 5$, which of the following numbers is rational and which is not?

(1) $\frac{a}{2b}$

(2) $\frac{b}{3-a}$

(3) $\frac{b-5}{a}$

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[9] Identify and write four rational numbers between $\frac{3}{2}$ and $\frac{3}{4}$, such that one of them is an integer.

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Sheet (3)
Adding and Subtracting Rational Numbers

Properties of the addition operation in Q:**(1) Closure property:**

The sum of any two rational numbers is a rational number.
i.e.: Q is closed under addition operation.

(2) Commutative property:

If a and b are two rational numbers, then
 $a + b = b + a$

(3) Associative property:

If a, b and c are three rational numbers, then
 $(a + b) + c = a + (b + c)$

(4) Additive identity:

Zero is the additive identity (additive neutral element).
If a is a rational number, then
 $0 + a = a + 0 = a$

(5) Additive inverse:

If a is a rational number, then
 $a + (-a) = \text{zero}$
for example: $\frac{3}{5} + \left(-\frac{3}{5}\right) = \text{zero}$

Properties of the subtraction operation in Q:

Q is closed under subtraction operation, but the subtraction operation in Q is not commutative, not associative, has no identity element and has no inverse.

[1] Complete:

- (1) The additive identity element in Q is
- (2) The additive inverse of $\frac{3}{7}$ is

- (3) The additive inverse of $-\frac{4}{9}$ is
- (4) $\frac{-6}{-11}$ is the additive inverse of the number
- (5) The additive inverse of $\left(\frac{2}{3}\right)^{\text{zero}}$ is
- (6) The additive inverse of $\left(\frac{-2}{7}\right)^{\text{zero}}$ is
- (7) The additive inverse of $\left|-\frac{4}{5}\right|$ is
- (8) The additive inverse of zero is

[2] Complete:

- (1) The remainder of subtracting $\frac{1}{5}$ from $\frac{6}{5}$ is
- (2) The remainder of subtracting $\frac{1}{3}$ from $-\frac{4}{3}$ is
- (3) The remainder of subtracting $-\frac{2}{3}$ from 0 is
- (4) $\frac{1}{5} + \dots = 0$

[3] Find the result of each of the following in the simplest form:

- (1) $\frac{3}{7} + \frac{2}{7} = \dots$
- (2) $-\frac{3}{5} - \frac{9}{5} = \dots$
- (3) $\frac{7}{8} - \frac{3}{8} = \dots$
- (4) $\frac{5}{6} + \left(\frac{-4}{6}\right) = \dots$
- (5) $-\frac{2}{9} + \frac{2}{9} = \dots$
- (6) $\frac{5}{9} + \left|-\frac{4}{9}\right| = \dots$

[4] Find the result of each of the following in the simplest form:

- (1) $-\frac{3}{10} + \left(-\frac{2}{5}\right) = \dots$
- (2) $\frac{1}{4} + \frac{25}{8} = \dots$
- (3) $\frac{-2}{5} - \frac{3}{15} = \dots$
- (4) $\frac{1}{5} - \frac{2}{3} = \dots$

(5) $\frac{3}{7} - \left(-\frac{2}{5}\right) = \dots\dots$

(6) $\frac{19}{10} + \left(-\frac{39}{100}\right) = \dots\dots$

(7) $-\frac{9}{12} + \frac{3}{16} = \dots\dots$

[5] Find the result of each of the following in the simplest form:

(1) $2\frac{2}{7} + 2\frac{3}{7} = \dots\dots$

(2) $9\frac{1}{5} - 7\frac{3}{5} = \dots\dots$

(3) $\frac{1}{4} + 2\frac{3}{8} = \dots\dots$

(4) $6\frac{2}{3} - 3\frac{1}{6} = \dots\dots$

(5) $-2\frac{1}{2} - 12\frac{1}{16} = \dots\dots$

(6) $2\frac{3}{8} + \frac{1}{4} = \dots\dots$

(7) $\frac{2}{5} + 0.2 = \dots\dots$

(8) $50\% + \frac{1}{4} = \dots\dots$

(9) $\frac{2}{3} - 0.\dot{3} = \dots\dots$

[6] Choose the correct answer:

(1) $\frac{3}{4} + 50\% = \dots\dots$

(a) 75%

(b) 150%

(c) $\frac{5}{4}$ (d) $\frac{3}{2}$

(2) Subtracting $\frac{1}{5}$ from $\frac{6}{5}$ gives

(a) 1

(b) -1

(c) $-\frac{3}{5}$ (d) $\frac{7}{5}$

(3) Subtracting $\frac{1}{3}$ from $\frac{-4}{3}$ gives

(a) -1

(b) 1

(c) $-\frac{5}{3}$ (d) $\frac{5}{3}$

(4) Subtracting $\frac{1}{7}$ from zero gives

(a) zero

(b) $\frac{1}{7}$ (c) $-\frac{1}{7}$ (d) $\frac{6}{7}$

(5) Subtracting $\frac{-3}{2}$ from zero gives

(a) zero

(b) $\frac{3}{2}$ (c) $-\frac{3}{2}$

(d) 1

(6) - $\frac{1}{2} = -1$

(a) $1\frac{1}{2}$

(b) $\frac{1}{2}$

(c) $-\frac{1}{2}$

(d) $-1\frac{1}{2}$

(7) $\frac{3}{5} + \dots = \text{zero}$

(a) $\frac{3}{5}$

(b) $-\frac{3}{5}$

(c) 1

(d) zero

[5] Using the properties in Q, find out the result of each of the following in the simplest form:

(1) $\frac{1}{4} + \frac{1}{2} + \frac{3}{4}$

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(2) $\frac{2}{7} + \frac{3}{4} + \frac{5}{7} + \frac{1}{4}$

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(3) $\frac{2}{13} + \frac{1}{5} + \frac{11}{13} + \left(-\frac{6}{5}\right)$

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(4) $\frac{5}{8} + \frac{1}{3} + \frac{3}{8} + \left(-\frac{1}{3}\right)$

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(5) $-\frac{3}{4} + \left(-\frac{3}{5}\right) + \left(-2\frac{1}{4}\right) + \frac{3}{5}$

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(6) $\left|-\frac{1}{2}\right| + \left(-\frac{2}{4}\right) + \frac{6}{4} + \frac{1}{2}$

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[6] If $x = \frac{2}{3}$, $y = -\frac{1}{2}$ and $z = \frac{1}{6}$ find in the simplest form the numerical value of each of the following:

(1) $y + z$

(2) $(x - y) - z$



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Sheet (4)
Multiplying and Dividing Rational Numbers

Properties of the Multiplication operation in Q:**(1) Closure property:**

The product of any two rational numbers is a rational number.
i.e.: Q is closed under multiplication operation.

(2) Commutative property:

If a and b are two rational numbers, then
 $a \times b = b \times a$

(3) Associative property:

If a, b and c are three rational numbers, then
 $(a \times b) \times c = a \times (b \times c)$

(4) Multiplicative identity:

One is the multiplicative identity (multiplicative neutral element).
If a is a rational number, then
 $1 \times a = a \times 1 = a$

(5) Multiplicative inverse (reciprocal of the number):

For any rational number $\frac{a}{b}$ except zero there is a multiplicative inverse that is the number $\frac{b}{a}$, where: $\frac{a}{b} \times \frac{b}{a} = 1$

- Zero has no multiplicative inverse because $\frac{1}{\text{zero}}$ is undefined.
- Multiplying any rational number by zero equals to zero.

(6) Distribution property:

If a, b and c are three rational numbers, then
 $a \times (b + c) = a \times b + a \times c$
 $a \times (b - c) = a \times b - a \times c$

Properties of operations:

operation Property	Addition	Subtraction	Multiplication	Division
Closure	✓	✓	✓	✗
Commutative	✓	✗	✓	✗
Associative	✓	✗	✓	✗
Identity element	✓ (0)	✗	✓ (1)	✗
Inverse	✓	✗	✓ except (0)	✗

[1] Complete:

- (1) The multiplicative identity element in \mathbb{Q} is
- (2) The multiplicative inverse of $\frac{3}{7}$ is
- (3) The multiplicative inverse of $-\frac{2}{3}$ is
- (4) The multiplicative inverse of -6 is
- (5) The multiplicative inverse of $3\frac{1}{2}$ is
- (6) The multiplicative inverse of 0.5 is
- (7) The multiplicative inverse of 1 is
- (8) The multiplicative inverse of -1 is
- (9) The multiplicative inverse of $\left(-\frac{3}{5}\right)^{\text{zero}}$ is
- (10) The multiplicative inverse of $\left|-\frac{3}{5}\right|$ is
- (11) The rational number that has no multiplicative inverse is
- (12) The rational number $\frac{a-1}{5}$ has a multiplicative inverse if $a \neq \dots\dots$

[2] Put (✓) for the correct statement and (✗) for the incorrect one:

(1) Every rational number has a multiplicative inverse. ()

(2) The multiplicative inverse of a rational number is an integer. ()

(3) The multiplicative inverse of the number $\frac{0}{7}$ is $\frac{7}{0}$. ()

(4) The multiplicative inverse of the number $2\frac{1}{5}$ is $5\frac{1}{4}$. ()

(5) The multiplicative inverse of the number $\left(\frac{2}{7} + \frac{3}{5}\right)$ is $\frac{35}{31}$. ()

[3] Complete:

The number	The additive inverse	The multiplicative inverse
$\frac{3}{7}$
$-\frac{4}{9}$
-6
0.5
$3\frac{1}{2}$
$\left(\frac{-3}{8}\right)^{\text{zero}}$
$\left|-\frac{3}{7}\right $
1
-1
0
$\frac{1}{5}$

[4] Complete:

(1) $\frac{3}{2} \times \left(\frac{-4}{5}\right) = \frac{-4}{5} \times \dots\dots$ property

(2) $\frac{2}{3} \times \frac{3}{2} = \dots\dots$ property

(3) $7 \times \frac{\dots}{7} = 1$ property

(4) $-\frac{4}{5} \times \dots\dots = -\frac{4}{5}$ property

(5) $-\frac{4}{11} \times \dots\dots = 1$ property

(6) $2\frac{3}{5} \times \dots\dots = 1$ property

(7) $0.8 \times \dots\dots = 1$ property

(8) $4 \times \dots\dots = -5$ property

(9) $\frac{2}{3} \left(2 + \frac{1}{2}\right) = \frac{2}{3} \times 2 + \dots \times \dots$ property

(10) $\frac{3}{9} = \frac{2}{3} \times \frac{\dots}{8}$

(11) If $\frac{x}{y} = \frac{2}{3}$ then, $\frac{3x}{2y} = \dots\dots$

(12) If $\frac{a}{b} = 70$ then $\frac{a}{2b} = \dots\dots$

[5] Find out the result of each of the following in the simplest form:

(1) $\frac{3}{5} \times \frac{2}{7} = \dots\dots$

(2) $\frac{-1}{2} \times \frac{2}{3} = \dots\dots$

(3) $-\frac{3}{8} \times \left(-\frac{5}{3}\right) = \dots\dots$

(4) $\frac{2}{6} \times \left(-\frac{3}{4}\right) = \dots\dots$

(5) $\left(-\frac{2}{3}\right) \times \frac{5}{8} = \dots\dots$

(6) $\frac{4}{5} \times \left(-\frac{5}{7}\right) = \dots\dots$

(7) $\left|-\frac{3}{7}\right| \times \left(-\frac{4}{3}\right) = \dots\dots$

(8) $\frac{1}{2} \times |-12| = \dots\dots$

[6] Find out the result of each of the following in the simplest form:

(1) $\frac{4}{5} \div \frac{3}{7} = \dots\dots$

(2) $-\frac{1}{6} \div \frac{5}{2} = \dots\dots$

(3) $\frac{-4}{11} \div \left(\frac{-4}{11}\right) = \dots\dots$

(4) $\frac{5}{27} \div \frac{1}{9} = \dots\dots$

(5) $\frac{5}{6} \div \left(\frac{-15}{2}\right) = \dots\dots$

(6) $\frac{-5}{8} \div \frac{5}{8} = \dots\dots$

(7) $zero \div \frac{3}{5} = \dots\dots$

(8) $1 \div \frac{7}{5} = \dots\dots$



[7] Find out the result of each of the following in the simplest form:

(1) $3\frac{1}{2} \times (-4) = \dots\dots$

(2) $1\frac{1}{2} \times \left(\frac{-3}{2}\right) = \dots\dots$

(3) $\left(-4\frac{2}{7}\right) \times \left(-5\frac{1}{6}\right) = \dots\dots$

(4) $3\frac{1}{8} \times \left(-4\frac{1}{5}\right) = \dots\dots$

(5) $\left(-1\frac{1}{2}\right) \times \left|-\frac{5}{3}\right| = \dots\dots$

(6) $0.\dot{6} \times 1\frac{1}{3} = \dots\dots$



[8] Find out the result of each of the following in the simplest form:

(1) $-2\frac{1}{5} \div \frac{11}{5} = \dots\dots$

(2) $-7\frac{5}{6} \div \frac{47}{100} = \dots\dots$

(3) $-4\frac{2}{7} \div 1\frac{1}{14} = \dots\dots$

(4) $-4\frac{1}{3} \div \left(-3\frac{1}{4}\right) = \dots\dots$

(5) $-2\frac{3}{4} \div \left(-3\frac{1}{8}\right) = \dots\dots$

(6) $6\frac{1}{4} \div (-15) = \dots\dots$



[9] Using the distribution property, find out the result of each of the following in the simplest form:

$$(1) \quad \frac{5}{12} \times 3 + \frac{5}{12} \times 9$$

$$(2) \quad \frac{4}{9} \times 11 + \frac{4}{9} \times 16$$

$$(3) \quad \frac{6}{37} \times 7 + \frac{6}{37} \times 5 + \frac{6}{37} \times (-11)$$

$$(4) \quad \frac{7}{12} \times 5 + \frac{7}{12} \times 9 - \frac{7}{12} \times 2$$

$$(5) \quad \frac{7}{13} \times 6 + \frac{7}{13} \times 8 - \frac{7}{13}$$

$$(6) \quad \left(\frac{-3}{7}\right) \times 8 + 5 \times \left(\frac{-3}{7}\right) + \left(\frac{-3}{7}\right)$$

[10] Find the result in the simplest form:

$$(1) \quad \left(\frac{3}{8} + \frac{5}{8}\right) \div \frac{5}{8} = \dots\dots$$

$$(2) \quad \frac{3}{4} \times \left(\frac{1}{2} - \frac{1}{3}\right) = \dots\dots$$

$$(3) \quad \left(\frac{-18}{5} \div \frac{9}{35}\right) \times \left(\frac{-3}{7}\right) = \dots\dots$$

$$(4) \quad -4\frac{1}{3} \div \left(-3\frac{1}{4}\right) = \dots\dots$$

$$(5) \quad \left[\frac{-12}{25} \times \left(-\frac{5}{7}\right)\right] \div \left(\frac{-9}{14}\right) = \dots\dots$$

$$(6) \quad \left[\left(-1\frac{2}{3}\right) \times 4\frac{2}{3}\right] \div 6\frac{1}{9} = \dots\dots$$

[11] Find the value of (n) in each of the following:

$$(1) \quad \frac{-7}{3} \times \frac{-3}{7} = n$$

$$(2) \quad n \times \frac{17}{3} = 1$$

$$(3) \quad \frac{-7}{3} \times n = 0$$

$$(4) \quad \frac{5}{7} \times n = \frac{5}{7}$$

$$(5) \quad n \times \left[\frac{1}{2} + \left(\frac{-3}{5} \right) \right] = n \times \frac{1}{2} + 5 \times \left(\frac{-3}{5} \right)$$

[12] If $a = 2$, $b = \frac{1}{2}$ and $c = \frac{3}{2}$, find in the simplest form the value of:
 $(a - b) \div c$

[13] If $x = \frac{1}{3}$, $y = \frac{3}{4}$ and $z = -3$, find in the simplest form the numerical value of each of the following:

(1) $x y z$

(2) $x y + z y$

[14] If $x = \frac{3}{4}$ and $y = \frac{-5}{3}$, find in the simplest form the value of the expression:

$$\frac{x - y}{x + y} \dots\dots\dots$$

Sheet (5)
Applications on Rational Numbers

- The distance between two numbers 2 and 5 is:
 $|2-5| = |5-2| = 3$ length units
- The distance between two numbers -2 and 3 is:
 $|-2-3| = |3+2| = 5$ length units
- From the side of the smallest number: $s + f(g - s)$
- From the side of the greatest number: ~~$g - f(g - s)$~~

Ex (1): Find the rational number lying at the middle of the way between 3 and 7.

$$\text{The number} = s + f(g - s) = 3 + \frac{1}{2}(7 - 3) = 5$$

Or

~~$$\text{The number} = g - f(g - s) = 7 - \frac{1}{2}(7 - 3) = 5$$~~

Ex (2): Find the rational number lying at the half-way between $\frac{2}{5}$ and $\frac{3}{7}$.

~~$$\text{The number} = s + f(g - s) = \frac{2}{5} + \frac{1}{2}\left(\frac{3}{7} - \frac{2}{5}\right) = \frac{29}{70}$$~~

Ex (3): Find the rational number lying at one third of the way between 2 and 8.

$$\text{From the side of the smaller number} = s + f(g - s) = 2 + \frac{1}{3}(8 - 2) = 4$$

~~$$\text{From the side of the greatest number} = g - f(g - s) = 8 - \frac{1}{3}(8 - 2) = 6$$~~


[1] Find the rational number in the middle of the way (half-way) between:

(1) $\frac{3}{8}$ and $\frac{5}{8}$

(2) $\frac{-3}{4}$ and $\frac{3}{4}$

(3) $\frac{1}{2}$ and $\frac{7}{8}$

(4) $\frac{-11}{4}$ and $\frac{-13}{35}$




[2] Find the rational number lying at:

(1) One fourth of the way between $\frac{5}{7}$ and $\frac{-3}{7}$ from the side of the smaller number.
.....

(2) One third of the way between $\frac{-3}{5}$ and $\frac{-4}{5}$ from the side of the greater number.
.....

(3) One third of the way between $\frac{4}{7}$ and $1\frac{3}{4}$ from the side of the smaller number.
.....

(4) One fifth of the way between $\frac{-2}{3}$ and $\frac{-3}{5}$ from the side of the smaller number.
.....



[3] Choose the correct answer:

- (1) If $a \times \frac{b}{2} = \frac{a}{2}$, $a \neq 0$, then $b = \dots$
 (a) $\frac{a}{2}$ (b) 0 (c) a (d) 1 (e) $-a$
- (2) If $\frac{x}{3} - 4 = 6$, then $\frac{x}{3} + \frac{2}{3} = \dots$
 (a) 1 (b) x (c) $\frac{32}{3}$ (d) 10 (e) $\frac{2x}{9}$
- (3) If $\frac{x}{y} = 1$, then $2x - 2y = \dots$
 (a) 4 (b) 2 (c) 1 (d) 0 (e) $\frac{1}{2}$
- (4) If $x + \frac{2}{x} = 5 + \frac{2}{5}$, then $x = \dots$
 (a) $\frac{1}{5}$ (b) $\frac{4}{5}$ (c) 1 (d) $\frac{5}{2}$ (e) 5
- (5) If $5a = 45$ and $ba = 1$, then $b = \dots$
 (a) $\frac{1}{45}$ (b) $\frac{1}{9}$ (c) $\frac{1}{5}$ (d) 5 (e) 9
- (6) The number $\frac{x-3}{x-5} \in \mathbb{Q}$ if $x \neq \dots$
 (a) 3 (b) -3 (c) 5 (d) -5 (e) 15

[4] Find three rational numbers lying between $\frac{3}{2}$ and $\frac{3}{4}$, such that one of them is an integer.

.....

Sheet (6)

Algebraic Terms & Algebraic Expressions

The perimeter and the area of some shapes

[1] The square:

$$\Rightarrow P = S \times 4 = 4 S \quad (\text{coeff.} = 4 \text{ and degree} = 1^{\text{st}})$$

$$\Rightarrow A = S \times S = S^2 \quad (\text{coeff.} = 1 \text{ and degree} = 2^{\text{nd}})$$

[2] Rectangle:

$$\Rightarrow P = (l + w) \times 2 = 2 (l + w)$$

$$\Rightarrow A = l \times w = l w \quad (\text{coeff.} = 1 \text{ and degree} = 2^{\text{nd}})$$

[3] Parallelogram:

$$\Rightarrow P = (x+y) \times 2 = 2(x+y)$$

$$\Rightarrow A = b \times h = b h$$

[4] Rhombus:

$$\Rightarrow P = S \times 4 = 4 S$$

$$\Rightarrow A = S \times h = S h \quad \text{or} \quad A = \frac{1}{2} \times d_1 \times d_2$$

[5] Triangle:

$$\Rightarrow P = \text{the sum of all side lengths}$$

$$\Rightarrow \text{Perimeter of equilateral triangle} = 3 S$$

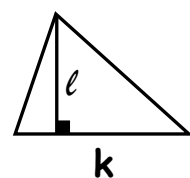
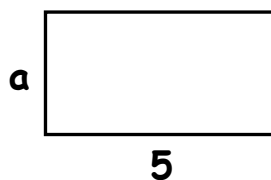
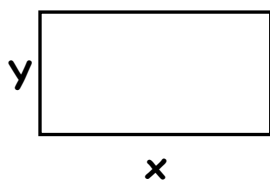
$$\Rightarrow A = \frac{1}{2} b h$$

$$\Rightarrow \text{If we denote one pound by } x, \text{ if we have 3 pounds}$$

$$x + x + x = 3 x \quad (\text{coeff.} = 3 \text{ and degree} = 1^{\text{st}})$$

- ☞ The algebraic term is formed from the product of two or more factors.
- ☞ The degree of the algebraic term is the sum of the indices of the algebraic factors in this term.
- ☞ Any number is an algebraic term of zero degree.
- ☞ The algebraic term has no algebraic factors is called the absolute term.
- ☞ The algebraic expression consists of an algebraic term (monomial) or more.
- ☞ The degree of the algebraic expression is the highest degree of its terms.

[1] Write the algebraic term that represent the area of each shape:



[2] Complete the table:

Algebraic term	$2 a b^2$	$7 a b^3 c$	$-8 x^2 b$	3	$(-2)^3$	$\frac{1}{2} x^3 y z^2$
Coefficient						
Degree						

[3] Complete the table:

The Algebraic expression	No. of terms	Name	Degree
$-3 a^5 b$			
$3x^2 + y$			
$5x^3 - 7x + 4$			
$2a^2 b + 3a b^2 - a^2 b^2$			
$x^2 y^2 - 3x y^4$			
$a^2 b - 3a b^3 + 2a^3 b^2 + b^4$			

[4] Complete:

- (1) The coefficient of algebraic term $3 x^2 y$ is and its degree is
- (2) The coefficient of algebraic term $\frac{1}{2} x^3 y z^2$ is and its degree is
- (3) The degree of the absolute term in an algebraic expression is
- (4) The algebraic expression $5x^2 + 3$ is of the degree.

[5] Choose the correct answer:

- (1) The degree of the algebraic term $2x^3y^2$ is
 (a) second (b) third (c) fourth (d) fifth
- (2) The coefficient of the algebraic term $3xy^3z^4$ is
 (a) 2 (b) 3 (c) 6 (d) 7

- (3) The degree of the algebraic expression $3x^2 + 3x^4$ equals to the degree of the algebraic expression
 (a) $5xy+3y^2z$ (b) $2x^2y^2 + 3x^2y$ (c) $2xy + 3x^4z$ (d) $5a^2b + 4ab^2$
- (4) The number of terms of the algebraic expression $3x^2+5xy+6$ is ...
 (a) 1 (b) 2 (c) 3 (d) 4
- (5) The operation is unclosed in the set of rational numbers.
 (a) addition (b) subtraction (c) division (d) multiplication
- (6) If the degree of the algebraic term $2a^3b^n$ is ninth, then $n =$
 (a) 8 (b) 6 (c) 2 (d) 9
- (7) The algebraic term $b^3 =$
 (a) $3 b \times b$ (b) $b + b + b$ (c) $b \times b \times b$ (d) $3 \times b$

[6] Arrange the terms of the following algebraic expressions according to the descending order of the indices of a:

- (1) $5a + a^2 - 7 + a^3$
- (2) $2 a^2 b^2 + 5 b a^3 - 3 b^3 a$

[7] Arrange the terms of the following algebraic expressions according to the ascending order of the indices of x:

- (1) $5x + x^2 - 7 + x^3$
- (2) $2 x^2 y^2 + 5 y x^3 - 3 y^3 x$

Sheet (7)
Like Algebraic Terms

☞ The algebraic terms are said to be like if they having the same symbols and the same degree. Such as:

Like terms	Unlike terms
☞ $2a$, a and $-5a$.	☞ $2x$, $-3x^2$ and $7x^3$
☞ $2x^2y$, $4yx^2$ and $-\frac{1}{2}x^2y$	☞ $4x^2$, $5xy$ and y^2

[1] Put (✓) for the correct statement and (×) for the incorrect one:

- (1) The two algebraic terms x^2 and $2x$ are like terms. ()
- (2) The two algebraic terms $3ab^2$ and $-ab^2$ are like terms. ()
- (3) The two algebraic terms $7x^2$ and $2x^7$ are like terms. ()
- (4) The two algebraic terms $3a^2b^3$ and $-2b^3a^2$ are like terms. ()
- (5) $2a + 3a = 5a^2$ ()
- (6) $7x^2 - 2x^2 = 5x^2$ ()
- (7) $8y^2 - 5y = 3y$ ()
- (8) $3ab - 3ba = \text{zero}$ ()

[2] Find the result of each of the following:

- (1) $3x + x = \dots\dots\dots$
- (2) $7y - y = \dots\dots\dots$
- (3) $3x + 2x = \dots\dots\dots$
- (4) $5y - 3y = \dots\dots\dots$
- (5) $4z - 11z = \dots\dots\dots$
- (6) $-7x - 2x = \dots\dots\dots$
- (7) $2a + 3a - 4a = \dots\dots\dots$
- (8) $-3a^2 + 5a^2 = \dots\dots\dots$
- (9) $\frac{5x}{4} + \frac{3x}{4} = \dots\dots\dots$
- (10) $\frac{3x}{5} - \frac{x}{5} = \dots\dots\dots$

[3] Answer each of the following:

- (1) Subtract y^2 from $-3y^2$
- (2) Subtract $-6x^2y$ from $9x^2y$
- (3) What is the increase $-2x$ of $-5x$?
- (4) What is the increase $3a^2b$ of a^2b ?
- (5) What is the decrease $-3ab$ of $2ab$?
- (6) What is the decrease $6x^2y$ of $-7x^2y$?

[4] Complete:

- (1) The result of subtracting $3a$ from $7a$ is
- (2) The result of subtracting $3x^2$ from $-5x^2$ is
- (3) The result of subtracting $7y^3$ from zero is
- (4) The result of subtracting $-3a$ from $2a$ is
- (5) $5a$ increases $3a$ by
- (6) $7x$ increases $-3x$ by
- (7) $4x$ decreases $7x$ by
- (8) $5x$ decreases $3x$ by
- (9) $2x$ decreases $4x$ by while $2x$ increases $4x$ by
- (10) + $2a^2 = 7a^2$
- (11) $3x^2 - \dots = x^2$
- (12) $2m^2 + \dots = \text{zero}$
- (13) $5a^2b - \dots = 7a^2b$
- (14) If $4x - y = 11$ and $y = 3x$, then $x = \dots$

[5] If the sum of two terms is $12x^2y$ one of them is $4x^2y$. Find the other term.

[6] Reduce to the simplest form:

(1) $3a + 2b + 5a + 4b =$

(2) $2x - 4y - 9x - 3y =$

(3) $3x - 5y - x + 2y =$

(4) $19m - 4n + 11m - 17n + 9n =$

(5) $4a + ab + 5a - 2b + 6b - 3a =$

[7] Reduce each of the following algebraic expressions:

(1) $5x + 4 - 3x^2 - 6x - 7x^2 - 1 =$

.....

.....

(2) $6x^2y - 3xy^2 + 2xy^2 - 5x^2y + 2x^2y^2 =$

.....

.....

(3) $a^2 + 4a - 5 + 3a^2 - 6a + 1 =$

.....

.....

(4) $5x^2 - 2x + 8 - 7x - 3 + x^2 =$

.....

.....

Sheet (8)
Adding and Subtracting Expressions

[1] Find the sum of each of the following:

(1) $3x - 2y + 5$ and $x + 2y - 2$

.....
.....
.....

(2) $3n^2 + 5n - 6$ and $-n^2 - 3n + 3$

.....
.....
.....

(3) $3l - 4m + 5n$ and $4m - 5n - l$

.....
.....
.....

(4) $3a^3 - 2a^2b + b^3$ and $a^3 + 4a^2b - b^3$

.....
.....
.....

[2] Find the sum:

(1) $3a + 2b - 5$, $2a - 7b + 4$, $5b - 4a + 3$

.....
.....
.....
.....

(2) $3x + 3y - z$, $3x + 3z - 2y$, $x + 2y + z$

.....
.....
.....
.....

(3) $5x^2 - 3x + 9$, $x^2 + 2x - 5$, $x^2 - 3 - 6x$

.....

.....

.....

.....

(4) $3x - 4x^2 + 2$, $x^2 + x - 5$, $3 + 3x^2 - 4x$

.....

.....

.....

.....



[3] Subtract:

(1) $x - 2$ from $2x - 5$

.....

.....

.....

(2) $2x + 6y - 7$ from $2x - 5y + 2$

.....

.....

.....



[4] What is the increase of:

(1) $5a + 7b$ than $3a - 2b$

.....

.....

.....

(2) $x^2 - 5x - 1$ than $3x^2 + 2x - 3$

.....

.....

.....



[5] What is the decrease of:

(1) $2a + 3b$ than $5b - 3a$

.....
.....
.....

(2) $3y^2 - 2xy + x^2$ than $3x^2 - 5xy + y^2$

.....
.....
.....

[6] Subtract $x + x^2 - 5$ from $2x^2 + x - 3$, then find the numerical value of the result when $x = 6$

.....
.....
.....

.....
.....
.....

Sheet (9)

Multiplying and Dividing Algebraic Terms

[1] Multiply:

(1) $5x \times 3y$ =

(2) $(-3a) \times 7c$ =

(3) $2x \times (-3x)$ =

(4) $(-8y^5) \times (-7y^4)$ =

(5) $2xy \times (-3x^2)$ =

(6) $5x^3y^4 \times 2xy^2$ =

(7) $5ab^2 \times (-2a^2b)$ =

(8) $ab \times (-3a) \times (-2b)$ =

(9) $2x^3 \times (-3x^2) \times (-5x^4)$ =

(10) $(-2x) \times 4x$ =


[2] If the symbols represent non-zero integers, find the quotient of each of the following:

(1) $6a \div 2$ =

(2) $10c \div 2c$ =

(3) $12x \div (-x)$ =

$$(4) \quad (-14x^2) \div 7x = \dots\dots\dots$$

$$(5) \quad (-25a^6) \div (-5a^2) = \dots\dots\dots$$

$$(6) \quad 24c^5 \div (-24c^5) = \dots\dots\dots$$

$$(7) \quad 9x^5y^4 \div 6x^3y = \dots\dots\dots$$

$$(8) \quad (-32a^3b^6) \div (-4a^3b^2) = \dots\dots\dots$$

$$(9) \quad 8m^4n^3 \div (-4m n^2) = \dots\dots\dots$$

[3] Simplify:

$$(1) \quad \frac{2}{3}t^4 \times \frac{3}{2}t^4 = \dots\dots\dots$$

$$(2) \quad \frac{2}{7}a^2 \times 21a^5 = \dots\dots\dots$$

$$(3) \quad \frac{6x^4y^2}{7} \times \frac{28xy^3}{3} = \dots\dots\dots$$

$$(4) \quad 3x^3 \times \frac{1}{6}x^2 = \dots\dots\dots$$

[4] Choose the correct answer:

$$(1) \quad 3a^4b \times 5a^2b^2 \times 2a^3 = \dots\dots\dots$$

$$(a) \quad 60a^{11}b^3$$

$$(b) \quad 30a^{10}b^2$$

$$(c) \quad 150a^{10}b^3$$

$$(d) \quad 30a^9b^3$$

(2) $(-3x^2y)^2 \times 2xy = \dots\dots$

(a) $-18x^5y^3$

(b) $18x^5y^3$

(c) $6x^3y^2$

(d) $9x^2y^2$

(3) $(-6x^3y^2) \div 3x^2y = \dots\dots$

(a) $-2x^2y$

(b) $2xy$

(c) $-2xy$

(d) $-2x^2y^2$

(4) If $2b$ cm is the edge length of a cube, then its volume = $\dots\dots$ cm³

(a) $4b^2$

(b) $2b^3$

(c) $4b^3$

(d) $8b^3$

(5) If the area of a rectangle is $24x^3$ cm² and its length is $8x^2$ cm, then its width is $\dots\dots$

(a) $3x$

(b) $3x^2$

(c) $4x$

(d) $4x^5$

[5] Complete:

(1) $9a^5 = 3a \times \dots\dots$

(2) $36a^5b^8 = 12a^3b^2 \times \dots\dots$

(3) $-4c^3d^3 = 2cd^2 \times \dots\dots$

(4) $81l^4 \div \dots\dots = 27l^3$

(5) $\dots\dots \div 6a^2 = -4a^4$

(6) $36a^7b^4 = \dots\dots \times 9a^7b$

Sheet (10)

*Multiplying a monomial by an algebraic expression***[1] Find the following products:**

(1) $a(a + 1) = \dots\dots\dots$

(2) $a(a - 2) = \dots\dots\dots$

(3) $3x(7y - 4z) = \dots\dots\dots$

(4) $-3(y + 3) = \dots\dots\dots$

(5) $-2c(7 - 3c) = \dots\dots\dots$

(6) $2x(3x^2 + 4y^2) = \dots\dots\dots$

(7) $-5x(2x + y - 3z) = \dots\dots\dots$

(8) $3xy(2x^2 - 5x^2y - 4y^2) = \dots\dots\dots$

(9) $lm^2(l^2 - 3ml - 4m^2) = \dots\dots\dots$

(10) $\frac{1}{3}x^2(6x^2 - 9xy - 3y^2) = \dots\dots\dots$

**[2] Put in the simplest form:**

(1) $3a(a - b) + 4a(2a + b) = \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

(2) $3a(4a - 2) - 4a(3a - 2) = \dots\dots\dots$

.....

.....



[3] Simplify $2a(3a - 1) + 3a(a + 2)$, then find the numerical value of the result when $a = 1$:

$2a(3a - 1) + 3a(a + 2) = \dots\dots\dots$

.....

.....

.....



Sheet (11)

Multiplying a binomial by an algebraic expression

We have 3 ideas of the examples on this lesson

1st idea this is the general idea

[1] Find by direct products:

$$(1) \quad (x + 3)(x + 2) = \dots\dots\dots$$

$$(2) \quad (x - 3)(x - 2) = \dots\dots\dots$$

$$(3) \quad (x + 2)(x - 5) = \dots\dots\dots$$

$$(4) \quad (y - 4)(y + 5) = \dots\dots\dots$$

$$(5) \quad (x + 2)(x + 4) = \dots\dots\dots$$


$$(6) \quad (y - 5)(y + 2) = \dots\dots\dots$$

$$(7) \quad (5m - 2)(6m + 1) = \dots\dots\dots$$

$$(8) \quad (4x + 1)(2x + 3) = \dots\dots\dots$$

$$(9) \quad (3a + 2b)(2a - 5b) = \dots\dots\dots$$

$$(10) \quad (b^2 - 4)(b^2 + 2) = \dots\dots\dots$$

$$(11) \quad (x - y)(7y - x) = \dots\dots\dots$$


2nd idea (special case of 1st idea)

[2] Find by inspection the expansion of each of the following:

(1) $(x + 2)^2 = \dots\dots\dots$

(2) $(x + 3)^2 = \dots\dots\dots$

(3) $(x + 1)^2 = \dots\dots\dots$

(4) $(x - 1)^2 = \dots\dots\dots$

(5) $(2y + 3)^2 = \dots\dots\dots$

(6) $(4m - 7)^2 = \dots\dots\dots$

(7) $(3x + y)^2 = \dots\dots\dots$

(8) $(x - 3y)^2 = \dots\dots\dots$

(9) $(2x + 3y)^2 = \dots\dots\dots$

(10) $(-l - m)^2 = \dots\dots\dots$

(11) $(-4x - 7)^2 = \dots\dots\dots$



3rd idea special case of 1st idea

[3] Find by inspection the expansion of each of the following:

(1) $(x + 3)(x - 3) = \dots\dots\dots$

(2) $(x - 4)(x + 4) = \dots\dots\dots$

$$(3) \quad (x - 2)(x + 2) = \dots\dots\dots$$

$$(4) \quad (4m - 7)(4m + 7) = \dots\dots\dots$$

$$(5) \quad (6x + 2y)(6x - 2y) = \dots\dots\dots$$

$$(6) \quad (a^2 + a)(a^2 - a) = \dots\dots\dots$$

$$(7) \quad (3x^2 + 5y^2)(3x^2 - 5y^2) = \dots\dots\dots$$

$$(8) \quad \left(\frac{1}{2}x + \frac{1}{3}y\right)\left(\frac{1}{2}x - \frac{1}{3}y\right) = \dots\dots\dots$$

[4] Choose the correct answer:

(1) The middle term in the expansion of $(3x - 1)^2$ is
 (a) $3x$ (b) $-6x$ (c) $6x$ (d) $6x^2$

(2) The middle term in the expansion of $(2a + 3b)^2$ is
 (a) $12ab$ (b) $-12ab$ (c) $6ab$ (d) $-6ab$

(3) If $(2x + y)^2 = 4x^2 + kxy + y^2$, then $k = \dots\dots\dots$
 (a) 2 (b) 4 (c) 8 (d) 6

(4) If $x = -1$, then the numerical value of $(x + 1)^2$ is
 (a) zero (b) 1 (c) 2 (d) 3

(5) If $x^2 = 16$, $y^2 = 9$ and $xy = 12$, then $(x - y)^2 = \dots\dots\dots$
 (a) 49 (b) 165 (c) -1 (d) 1

(6) If $(x + y)^2 = 26$ and $x^2 + y^2 = 20$, then $xy = \dots\dots\dots$
 (a) 3 (b) 6 (c) 9 (d) 12

- (7) If $x + y = 7$, then the numerical value of $x^2 + 2xy + y^2 = \dots$
 (a) 7 (b) 14 (c) 49 (d) 28
- (8) If $x - y = 3$ and $x + y = 5$, then $x^2 - y^2 = \dots\dots$
 (a) 2 (b) -2 (c) 8 (d) 15
- (9) If $x = \frac{4}{3}$, then $(x - 2)(x + 2) = \dots\dots$
 (a) $\frac{4}{3} - 2$ (b) $\left(\frac{4}{3}\right)^2 - 2$ (c) $\left(\frac{4}{3}\right)^2 - 4$ (d) $\left(\frac{4}{3}\right)^2 + 4$
- (10) If $(x - 3)(x + 3) = x^2 + k$, then $k = \dots\dots$
 (a) 9 (b) 6 (c) -9 (d) -6
- (11) If $(x - y)(2x + y) = 2x^2 + kxy - y^2$, then $|k| = \dots\dots$
 (a) -1 (b) 1 (c) 3 (d) 4

[5] Multiply, then find the numerical value of the expression when $x = 1$ and $y = -2$:

- (1) $(x - 5y)(x + 5y) = \dots\dots\dots$

- (2) $(3x + y)(x + 3y) = \dots\dots\dots$

- (3) $(x + 4)(3x + 2) = \dots\dots\dots$

- [6] Reduce $(x - y)^2 + 2xy$, then find the numerical value of the result when $x = -1$ and $y = -2$:

.....

.....

.....

.....

.....



- [7] Reduce $(2x - 2)^2 + (x - 2)(x + 2)$, then find the numerical value of the result when $x = -1$:

.....

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.....

.....

.....



- [8] Simplify to the simplest form $(2a - 3)(2a + 3) + 7$, then find the numerical value of the result when $a = -1$:

.....

.....

.....

.....

.....

Sheet (12)

Dividing an algebraic expression by a monomial

[1] If the symbols in the following expressions are non-zero numbers, find the quotient in each case:

(1) $5a - 10$ by 5 =

(2) $4a^2 + 6a$ by $2a$ =

(3) $12a^2b + 20a b^2$ by $4a b$ =

(4) $16a^3b^2 - 24a^2b^2$ by $4a^2b$ =

(5) $12x + 15y$ by -3 =

(6) $24x^3 - 18x^2$ by $-6x^2$ =

(7) $60x^6 - 48x^{10} - 12x^3$ by $-12x^3$ =

(8) $32x^5 - 48x^3 + 72x^7$ by $-8x^3$ =

[2] Find the quotient of each of the following:

(1) $\frac{26x^2 + 14x^4}{2x}$ =

(2) $\frac{18m^4 + 32m^2}{-2m^2}$ =

(3) $\frac{48x^3 - 80x^2}{8x^2}$ =

(4) $\frac{9l^3m^4 - 18l m^2}{3l m^2}$ =

[3] Choose the correct answer:

- (1) $(x^2 + x) \div x = \dots\dots, x \neq 0$
(a) zero (b) x (c) $2x + 1$ (d) $x + 1$
- (2) $(15a + 5) \div 5 = \dots\dots$
(a) $3a$ (b) $10a$ (c) $3a + 1$ (d) $4a$
- (3) $(4a^3 - 2a) \div (-2a) = \dots\dots, a \neq 0$
(a) $-2a^2$ (b) $-2a^2 + 1$ (c) $2a^2 + 1$ (d) -1
- (4) $(15x^4 + 5x^3) \div 5x^3 = \dots\dots$
(a) $3x^2 + x$ (b) $5x^2 + 1$ (c) $3x + 1$ (d) $4x^4$
- (5) $(3x^2y - \dots\dots) \div 3xy = x - 2y$
(a) $6x$ (b) $6xy^2$ (c) $6y^2$ (d) $-6xy^2$
- (6) If $(6x^2y^3 + kxy) \div 6x = xy^3 - 12y, x \neq 0$, then $|k| = \dots\dots$
(a) -72 (b) -2 (c) 2 (d) 72

Sheet (13)

Dividing an algebraic expression by another one

[1] Find the quotient of each of the following:

(1) $x^2 + 5x + 6$ by $x + 2$

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(2) $y^2 - 9y + 20$ by $y - 4$

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(3) $x^2 - 5x - 14$ by $x - 7$

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(4) $2x^2 + 13x + 15$ by $x + 5$

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(5) $3x^2 + 2x - 8$ by $3x - 4$

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(6) $x^2 - 6 - x$ by $x + 2$

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[2] If the area of a rectangle is $(15x^2 + 11x - 14)$ cm² and its width is $(3x - 2)$ cm. Calculate its length.

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[3] If the area of a rectangle is $(2x^2 + 7x - 15)$ cm² and its length is $(x + 5)$ cm. Find its width and calculate its perimeter when $x = 3$.


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Sheet (14)

Factorization by identifying the H.C.F.

1st idea we take the repeated number or repeated symbol out

[1] Factorize each of the following by identifying the H.C.F.:

$$(1) \quad 5a + 5b = \dots\dots\dots$$

$$(2) \quad 3x - 3y = \dots\dots\dots$$

$$(3) \quad 7x y + 7y z = \dots\dots\dots$$

$$(4) \quad 5a - 5b + 5c = \dots\dots\dots$$

$$(5) \quad 3x(a + b) + 7(a + b) = \dots\dots\dots$$

$$(6) \quad a(a + 3) + b(a + 3) = \dots\dots\dots$$

$$(7) \quad (x + 4)x^2 + (x + 4)y^2 = \dots\dots\dots$$

2nd idea if one of the two terms divisible by the other

[2] Factorize each of the following by identifying the H.C.F.:

$$(1) \quad 5y + 10 = \dots\dots\dots$$

$$(2) \quad 8y^3 - 4x^2 = \dots\dots\dots$$

$$(3) \quad 5a b - 15b c = \dots\dots\dots$$

$$(4) \quad 3x^2 + 6x = \dots\dots\dots$$

$$(5) \quad 35a + 10a^2 = \dots\dots\dots$$

$$(6) \quad 4a b^2 - 7b^3 = \dots\dots\dots$$

$$(7) \quad 35x^3y - 5x y^2 = \dots\dots\dots$$

$$(8) \quad 15a^3b - 5a^2b^2 = \dots\dots\dots$$

[3] Factorize each of the following by identifying the H.C.F. :

$$(1) \quad 6a^3 - 4a^2b^2 = \dots\dots\dots$$

$$(2) \quad 6a + 8b - 10c = \dots\dots\dots$$

$$(3) \quad x^3 + 2x^2 + 5x = \dots\dots\dots$$

$$(4) \quad 2x^2y + 6x y^2 - 2y = \dots\dots\dots$$

$$(5) \quad 9m^4n^2 - 6m^3n^3 + 12m^2n^4 = \dots\dots\dots$$

$$(6) \quad -2x^5 + 4x^2 - 6x + 2x^3 = \dots\dots\dots$$

$$(7) \quad 18a^2b c - 6a b c + 30a b c^2 = \dots\dots\dots$$

$$(8) \quad 15a^3b^4 + 6a^5b^3 - 3a^2b^2 = \dots\dots\dots$$

$$(9) \quad 14a(x + y) - 21b(x + y) = \dots\dots\dots$$

$$(10) \quad 6a^2(x - 1) - 8a(x - 1) = \dots\dots\dots$$

$$(11) \quad 3x^2(x - 7) + 2x(x - 7) + 5(x - 7) = \dots\dots\dots$$

$$(12) \quad 4m^2(2x + y) - 3m(2x + y) - 7(2x + y) = \dots\dots\dots$$

[4] Find the result by identifying the H.C.F.:

(1) $48 \times 45 + 48 \times 55$

=

=

(2) $7 \times 123 + 7 \times 35 - 7 \times 18$

=

=

(3) $15 \times 17 + 15 \times 13 - 15 \times 30$

=

=

(4) $(256)^2 - 256 \times 156$

=

=

=

(5) $6 \times (15)^2 + 18 \times 15 - 8 \times 15$

=

=

=

(6) $5 \times (48)^2 + 7 \times 48 + 53 \times 48$

=

=

=



[5] Complete:

- (1) $6a^2 + 12ab = 3a(\dots + \dots)$
- (2) $a^2b + b^2a = \dots (a + b)$
- (3) $3(a - b) - 4(b - a) = \dots (a - b)$
- (4) $x(a + 1) - y(a + 1) = (a + 1)(\dots - \dots)$
- (5) If $a + b = 3$, then $5a + 5b = \dots$
- (6) If $7x - 7y = 21$, then $x - y = \dots$
- (7) If $2x + y = 7$ and $a + b = 3$, then $2x(a + b) + y(a + b) = \dots$

[6] Choose the correct answer:

- (1) $3x - 9x^2 = \dots$
 (a) $12x$ (b) $-6x$ (c) $-6x^2$ (d) $3x(1 - 3x)$
- (2) $7x^2 + 14y^2 = 7(\dots)$
 (a) $x^2 + y^2$ (b) $x^2 + 2y^2$ (c) $7x^2 + y^2$ (d) $x + 2y$
- (3) $4x^2y^2 - 2xy^2 + 4x^2y = \dots (2xy - y + 2x)$
 (a) $4xy$ (b) $2xy$ (c) $2x$ (d) $2y$
- (4) $(75)^2 + 75 \times 25 = \dots$
 (a) 75 (b) 750 (c) 7500 (d) 75000
- (5) $8 + 8^2 = 8 \times \dots$
 (a) 8 (b) 9 (c) 80 (d) 90
- (6) The H.C.F. of the expression $12x^3y^4 + 8x^2y^3$ is
 (a) $2x^2y^3$ (b) $4x^2y^3$ (c) $4x^3y^4$ (d) $12x^3y^4$

Sheet (15)

The mode

[1] Complete:

- (1) The mode of a set of values is
- (2) The mode of the values 6, 5, 7, 6 is
- (3) The mode of the values 2, 3, 8, 2, 9 is
- (4) The mode of the values 3, 6, 10, 13, 19, 19, 21 is
- (5) The mode of the values 5, 33, 5, 33, 3, 5 is
- (6) The mode of the values 8, 11, 5, 8, 4, 5, 4, 11, 4 is
- (7) If the mode of the values 4, a , 5, 3, is 3 then $a =$
- (8) If the mode of the values $\frac{1}{3}, \frac{1}{7}, \frac{1}{5}, \frac{1}{7}$ is $\frac{1}{x}$ then $x =$
- (9) If the mode of the values 12, 7, $x + 1$, 7, 12 is 12 then $x =$
- (10) If the mode of the values $a+2, a+1, a+3, a+2$ is 12 then $a =$

[2] The following frequency table represents the marks of 40 pupils in an examination:

The mark	15	16	17	18	19	20
No. of pupils (frequency)	4	5	8	12	7	4

Find the mode mark.

[3] The following frequency table shows the number of studying hours of 30 pupils in a week:

The number of studying hours	25	26	27	28	29	30
No. of pupils (frequency)	3	5	12	6	3	1

Find the mode number of studying hours.

[4] The following frequency table shows the maximum temperature degree registered in some arabic capitals:

Temperature degree	18	19	20	21	22	23
No. of captials (frequency)	3	2	4	6	2	1

(1) Represent these data by bar charts graph.

(2) Find the mode number of temperature degrees.

اكتب ذاكرولي في البحث وانضم لجروبات ذاكرولي
مع رياض الاطفال للصف الثالث الاعدادي

Sheet (16)

The median

[1] Choose the correct answer:

- (1) The median of: 4, 8, 3 is
(a) 3 (b) 4 (c) 5 (d) 8
- (2) The median of: 6, 5, 9, 8 is
(a) 5 (b) 6 (c) 7 (d) 7.5
- (3) The median of: 8, 17, 4, 6, 10 is
(a) 11 (b) 10 (c) 8 (d) 6
- (4) The median of: 3, 7, 2, 9, 5, 11 is
(a) 5 (b) 6 (c) 7 (d) 12
- (5) The median of: 25, 32, 28, 40, 50, 58, 50 is
(a) 40 (b) 45 (c) 50 (d) 58
- (6) The median of: 2, 5, 5, 6, 7, 9, 11, 14, 16, 21 is
(a) 7 (b) 8 (c) 9 (d) 16
- (7) The order of the median of: 6, 2, 5, 4, 1 is
(a) 1st (b) 2nd (c) 3rd (d) 4th
- (8) If the order of the median of a number of ordered values is the third, then the number of these values is
(a) 3 (b) 4 (c) 5 (d) 6

[2] Write these numbers in an ascending order, then find the median:

2.9, 2.3, 1.6, 9.1, 2.8, 0.7, 8.1, 7.3, 6.2, 5.3, 12.2, 4.3, 8.5

.....

[3] Write these numbers in a descending order, then find the median:

17.9, 7.4, 25.7, 8.9, 16.6, 3.8, 10.3, 32.3, 13.7, 0.5, 20.3, 16.3

.....

Sheet (17)
The arithmetic mean

[1] Choose the correct answer from the given ones:

- (1) The mean of: 5, 12, 6, 17 is
 (a) 4 (b) 5 (c) 6 (d) 10
- (2) The mean of: 2, 5, 8, 9, 14, 28 is
 (a) 6 (b) 8 (c) 9 (d) 11
- (3) The mean of: 3, zero, 4, 6, 7 is
 (a) 4 (b) 5 (c) 6 (d) 7
- (4) The mean of: $2-a$, 4, 1, 5, $3+a$ is
 (a) 1 (b) 2 (c) 3 (d) 15
- (5) The mean of: $x+y$, $9-y$, $-x$ is
 (a) 3 (b) 9 (c) 2 (d) zero
- (6) The mean of: x , $x-y$, $y-x$ is
 (a) xy (b) $\frac{y}{2}$ (c) $\frac{x}{2}$ (d) $\frac{x}{3}$
- (7) If the mean of: 9, 4, 5, x is 5, then $x =$
 (a) 2 (b) 3 (c) 4 (d) 5
- (8) If the mean of: 3, 4, 8, a , $a+2$ is 15, then $a =$
 (a) 29 (b) 58 (c) 75 (d) 17
- (9) If the mean of: $x-1$, x , $x+1$ is 6, then $x =$
 (a) 18 (b) 9 (c) 15 (d) 6
- (10) If the mean of marks of 5 students is 20, then the sum of their marks is marks
 (a) 4 (b) 15 (c) 25 (d) 100
- (11) If the mean of two ages of Hanan and Wesam is 7 years old and age of Hanan is 8 years old, then the age of Wesam is years
 (a) 6 (b) 7 (c) 8 (d) 15
- (12) If the mean of side lengths of a triangle is 8 cm, then the peremeter of the triangle is cm
 (a) 8 (b) 18 (c) 24 (d) 15

- [2] If the heights of 5 students in grade 1 prep. in cm. are 124, 130, 122, 126, 128, calculate the mean height of those students.

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- [3] If the number of goals registered by a team in 6 matches are 3, 2, 0, 6, 1, 6, calculate the mean of the number of goals.

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- [4] This table shows the number of hours that the two athletes trained in each month of the year:

Gamal	75	72	68	46	57	66	63	70	58	30	48	53
Ali	62	64	54	52	63	68	56	65	70	50	49	57

(1) Calculate the mean of the number of training hours of Gamal.

(2) Calculate the mean of the number of training hours of Ali.

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Prep. [1] - First Term – Algebra – Unit [1] - Rational Numbers

Lesson [1] : Set Of Rational Numbers

Remember :

- You studied in the primary stage some sets of numbers as :
 - * Set of counting numbers = $\{1, 2, 3, 4, \dots\}$
 - * Set of natural numbers $\mathbb{N} = \{0, 1, 2, 3, 4, \dots\}$
 - * Set of integers $\mathbb{Z} = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$
- In this unit , you will recognize another set of numbers is called "The set of rational numbers" and it is denoted by the symbol \mathbb{Q}

Rational Numbers :

The numbers : $\frac{1}{2}$, $-\frac{5}{8}$, 3 , 0 , $3\frac{1}{2}$, 0.7 , 2.5 and 15% are rational numbers.

The set of rational numbers $\mathbb{Q} = \{x; x = \frac{a}{b}, a \in \mathbb{Z}, b \in \mathbb{Z}, b \neq 0\}$

Based on the previous definition , we can say that :

- 1** All the decimal numbers are rational numbers.
- 2** All percents are rational numbers.
- 3** All integers are rational numbers.

Therefore : The set of integers is a subset of the set of rational numbers.

i.e. $\mathbb{Z} \subset \mathbb{Q}$

and since $\mathbb{N} \subset \mathbb{Z}$ then $\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q}$
and the opposite diagram shows that.



Remarks

Each integer is a rational number , but not each rational number is an integer.

If $\frac{a}{b}$ is a rational number , then $b \neq 0$

If the rational number $\frac{a}{b} = 0$, then $a = 0$

The rational number $\frac{a}{b}$ can be written in the form of another rational number $\frac{c}{d}$ equal to it by applying the following property :

The value of the rational number $\frac{a}{b}$ does not change if its two terms are multiplied or divided by an integer \neq zero.

Terminated Decimal		Recurring Decimal	
$\frac{1}{2} = 0.5$	$\frac{2}{5} = 0.4$	$\frac{1}{3} = 0.3333333333 = 0.\dot{3}$	$\frac{13}{33} = 0.3939393939 = 0.\dot{3}\dot{9}$
$\frac{1}{4} = 0.25$	$\frac{3}{8} = 0.375$	$\frac{2}{3} = 0.6666666666 = 0.\dot{6}$	$\frac{17}{33} = 0.5151515151 = 0.\dot{5}\dot{1}$
$\frac{3}{4} = 0.75$	$\frac{5}{8} = 0.625$	$\frac{5}{9} = 0.5555555555 = 0.\dot{5}$	$\frac{19}{33} = 0.5757575757 = 0.\dot{5}\dot{7}$

Lesson [3] : Adding And Subtracting Rational Numbers

Properties of the addition operation in \mathbb{Q}

1 Closure property :

The sum of any two rational numbers is a rational number.
i.e. \mathbb{Q} is closed under addition operation.

2 Commutative property :

If a and b are two rational numbers , then $a + b = b + a$

3 Associative property :

If a , b and c are three rational numbers , then
 $(a + b) + c = a + (b + c)$

4 The existence of identity element (Neutral element) property in addition :

Then we say : zero is the identity element in addition operation in \mathbb{Q}

5 The existence of additive inverse property :

For every rational number a there exist an additive inverse to it that is $-a$
where $a + (-a) = \text{zero (the identity element in addition)}$

For example:

The additive inverse of the number $\frac{3}{4}$ is $-\frac{3}{4}$

and vice versa the additive inverse of $-\frac{3}{4}$ is $\frac{3}{4}$

because $\frac{3}{4} + \left(-\frac{3}{4}\right) = \left(-\frac{3}{4}\right) + \frac{3}{4} = \text{zero (the identity element in addition)}$.

Notice that :

Zero is its own additive inverse.

Second : Subtraction operation

Since each rational number has an additive inverse , then the subtraction operation is always possible in \mathbb{Q} and it is defined as follows :

Definition :

If a and b are two rational numbers , then $a - b = a + (-b)$

Remarks

- \mathbb{Q} is closed under subtraction operation i.e. the result of subtracting any two rational numbers is a rational number.
- The subtraction operation in \mathbb{Q} is not commutative and not associative.
- There is no identity element with respect to subtraction in \mathbb{Q} and hence there is no inverses for the numbers with respect to subtraction in \mathbb{Q}

Lesson [4] : Multiplying And Dividing Rational Numbers**Properties of the set of rational numbers under multiplication****1 Closure property :**

The product of any two rational numbers is a rational number.

i.e. \mathbb{Q} is closed under multiplication operation.

2 Commutative property :

If a and b are two rational numbers , then : $a \times b = b \times a$

3 Associative property :

If a , b and c are three rational numbers , then : $(a \times b) \times c = a \times (b \times c)$

4 The existence of multiplicative identity (neutral) element property :

Then we say : the number 1 is the multiplicative identity (neutral) in \mathbb{Q}

5 The existence of multiplicative inverse of the rational number property :

For every rational number $\frac{a}{b}$ except zero there is a multiplicative inverse that is the rational number $\frac{b}{a}$ where $\frac{a}{b} \times \frac{b}{a} = 1$ (the multiplicative identity)

For example: • The multiplicative inverse of the number $\frac{3}{2}$ is $\frac{2}{3}$

and vice versa the multiplicative inverse of $\frac{2}{3}$ is $\frac{3}{2}$

Remarks

- The multiplicative inverse of the rational number is called the reciprocal of the rational number.
- Zero has no multiplicative inverse because : $\frac{1}{\text{zero}}$ is meaningless i.e. (undefined)
- The multiplicative inverse of the number 1 is itself and the multiplicative inverse of the number - 1 is itself also.
- Multiplying any rational number by zero equals zero.

For example: $0 \times \frac{1}{2} = 0$, $-\frac{5}{8} \times 0 = 0$

6 Property of distributing multiplication over addition and subtraction :

If a , b and c are three rational numbers , then :

1 $a \times (b + c) = a \times b + a \times c$, $(b + c) \times a = b \times a + c \times a$

i.e. Multiplication is distributed over addition in \mathbb{Q} from right and from left.

2 $a \times (b - c) = a \times b - a \times c$, $(b - c) \times a = b \times a - c \times a$

i.e. Multiplication is distributed over subtraction in \mathbb{Q} from right and from left.

Second : Division operation

Since every rational number (except zero) has a multiplicative inverse , then we can define the division operation in \mathbb{Q} as follows :

Definition :

If $\frac{a}{b}$, $\frac{c}{d}$ are two rational numbers , $\frac{c}{d} \neq \text{zero}$, then $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$

- Since division by zero is impossible in \mathbb{Q} , therefore \mathbb{Q} is not closed with respect to division operation.
- Division operation in \mathbb{Q} is not commutative and not associative.
- There is no identity element in division operation in \mathbb{Q} and hence there are no inverses numbers with respect to division operation in \mathbb{Q}

Lesson [5] : Applications On The Rational Numbers**The Distance Between Two Numbers :**

Distance between number X and Number Y = $|X - Y|$ or $|Y - X|$ where $|X - Y| = |Y - X|$

For Example :

Distance between 5 and 2 = $|5 - 2|$ or $|2 - 5| = 3$ Units

The Number That Lies Halfway :

The Number That Lies Halfway = (First number + Second Number) \div 2

For Example :

The Number That Lies Halfway = ($\frac{1}{2} + \frac{4}{5}$) \div 2 = $\frac{13}{20}$

The Number That Lies Third Of The Way :

Third from smaller = smaller + $\frac{1}{3}$ | smaller – greater |

Third from greater = greater – $\frac{1}{3}$ | smaller – greater |

The Number That Lies Fourth Of The Way :

Third from smaller = smaller + $\frac{1}{4}$ | smaller – greater |

Third from greater = greater – $\frac{1}{4}$ | smaller – greater |

The Number That Lies Fifth Of The Way :

Third from smaller = smaller + $\frac{1}{5}$ | smaller – greater |

Third from greater = greater – $\frac{1}{5}$ | smaller – greater |


Prep. [1] - First Term – Algebra – Unit [2] - Algebra**Lesson [1] : Algebraic Terms And Algebraic Expressions****Introduction : Variable And Constant :**

A variable is a letter as : X or y or n or which represents any number in a specifies set of numbers.

A constant is a number or letter represents only one number

Algebraic Term (monomial) :

The algebraic term is formed from the product of two or more factors.

 The degree of the algebraic term:

It is the sum of the indices of the algebraic factors in this term.

Algebraic Expression :

The algebraic expression consists of an algebraic term (monomial) or more .

 The Degree Of The Algebraic Expression:

It is the highest degree of the terms forming it.

Absolute Term :

The algebraic term that has no algebraic factors is called the absolute term as the term (-1) in the expression : $X^3 - 1$

Remarks

Any number is an algebraic term of zero degree.

Solutions

12 ① Third , 3 ② $\frac{1}{2}$, sixth ③ 1 , first ④ zero ⑤ - 8 , zero ⑥ second ⑦ 3 , second

Lesson [2] : Like algebraic terms

The algebraic terms are said to be like if the algebraic symbols forming their factors are like and the indices of these symbols are equal.

Adding and subtracting like terms

Adding or subtracting operation performs as the following :

- 1 Add or subtract the numerical coefficients.
- 2 Use the sum or the difference as the coefficient of the result algebraic term.

Prep. [1] - First Term – Algebra – Unit [3] - Statistics

Lesson [2] : The Mode



Definition :

The mode of a set of values is the most common value.

Example 1

Find the mode of each of the following :

1 5 , 8 , 7 , 5 , 6 , 8 , 5

2 22 , 2 , 7 , 22 , 7 , 7

Solution

- 1 The most common value (the most frequent) is 5 , then the mode = 5
- 2 The most common value (the most frequent) is 7 , then the mode = 7

Lesson [3] : The Median



Definition :

The median of a set of values is the value which divides this set such that the number of values which are greater than it is equal to the number of values which are less than it.

To get the median do as follows :

Arrange the values ascendingly or descendingly

then

If the number of values is odd, then :
The median is the value which is
in the middle exactly.

For example:

• If the values are :

42 , 23 , 17 , 30 , 20

Then its ascending order is :

17 , 20 , 23 , 30 , 42

the median = 23

If the number of values is even, then :
The median

$$= \frac{\text{The sum of two middle values}}{2}$$

For example:

• If the values are :

27 , 13 , 23 , 24 , 13 , 21

Then its ascending order is :

13 , 13 , 21 , 23 , 24 , 27

$$\text{the median} = \frac{21 + 23}{2} = 22$$

Remarks

$$\text{Order of median} = \frac{\text{number of values} + 1}{2}$$

For Example : -

If the number of values is : 13 then the order of median = $\frac{13+1}{2} = 7$

If the number of values is : 7 then the order of median = $\frac{7+1}{2} = 4$

If the order of median = 5 , then the number of values = $5 \times 2 - 1 = 9$

If the order of median = 4 , then the number of values = $4 \times 2 - 1 = 7$

If the order of median = 8 , then the number of values = $8 \times 2 - 1 = 15$

Lesson [4] : The Mean



Definition :

- The mean of a set of values = $\frac{\text{Sum of these values}}{\text{Number of these values}}$

Example 1

If the marks of 6 students in an examination are : 25 , 16 , 47 , 28 , 45 and 49
Calculate the mean of these marks.

Solution

$$\text{The mean} = \frac{\text{Sum of marks}}{\text{Number of students}} = \frac{25 + 16 + 47 + 28 + 45 + 49}{6} = \frac{210}{6} = 35 \text{ marks}$$

We notice that: If each student obtained 35 marks , then the sum of marks is the same sum of the original marks.

Example 2

If the mean of the values : 5 , 7 , x and 9 is 6 Find the value of x

Solution

$$\text{Since the mean} = \frac{\text{Sum of values}}{\text{Number of values}}$$

$$\text{Then } 6 = \frac{5 + 7 + x + 9}{4} \quad , \text{ then } 6 = \frac{21 + x}{4} \quad , \text{ then } x = 3$$

Important remark

The rational number that lying at the middle of the distance between any two rational numbers = the mean of the two numbers.

For example:

The rational number that lies at the middle of the distance between $\frac{1}{2}$ and $\frac{3}{5}$

$$= \left(\frac{1}{2} + \frac{3}{5} \right) \div 2 = \left(\frac{5}{10} + \frac{6}{10} \right) \div 2 = \frac{11}{10} \times \frac{1}{2} = \frac{11}{20}$$

Exercises

Quiz A	Date :		الاسم
Mark		15	توقيع ولي الأمر

1	The number $\frac{X+7}{X-7} \in \mathbb{Q}$, if $X \neq$	A) 3	B) 4	C) 5	D) 7
2	If $\frac{X}{Y} = 1$, then $2 X - 2 Y =$	A) 1	B) 2	C) 0	D) 4
3	If $\frac{X-2}{X-5}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
4	If : $\frac{20}{X} = \frac{4}{5}$ then $X =$	A) 25	B) 4	C) 15	D) 45
5	The number $\frac{5}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
6	$0.\dot{5}\dot{7} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
7	The rational number $\frac{X+9}{X+5} = 0$, when $X =$	A) - 5	B) - 6	C) - 9	D) - 8
8	If $\frac{X}{Y} = 1$, then $5 X - 5 Y =$	A) 5	B) 0	C) 7	D) 9
9	If $\frac{X-2}{X-8}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
10	If : $\frac{2}{5} = \frac{X}{10}$ then $X =$	A) - 20	B) 4	C) 10	D) 15
11	The number $\frac{2}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
12	The number $0.7 =$ (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
13	If $\frac{X-8}{X-9} = 0$, then the value of X is	A) 5	B) 6	C) 7	D) 8
14	The necessary condition to make $\frac{X-1}{X+1}$ a rational number is $X \neq$	A) - 1	B) - 2	C) 3	D) 4
15	If $\frac{X}{Y} = 1$, then $8 X - 8 Y =$	A) 0	B) 6	C) 7	D) 9

Quiz B	Date : .....	.....	الاسم
Mark	.....	16	توقيع ولي الأمر

1	The necessary condition to make $\frac{7}{X+5}$ a rational number is $X \neq$	A) -3	B) -5	C) 3	D) 5
2	If $\frac{X}{Y} = 1$, then $7X - 7Y =$	A) 5	B) 6	C) 7	D) 0
3	If $\frac{7}{3-X} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
4	If : $\frac{X}{24} = \frac{5}{8}$ then $X =$	A) -20	B) 4	C) 10	D) 15
5	The number $\frac{4}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
6	$0.5\dot{1} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
7	The rational number $\frac{X+8}{X+9} = 0$, when $X =$	A) -5	B) -6	C) -7	D) -8
8	$0.\dot{6} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$
9	If $\frac{X+3}{X+9} = 0$, then the value of X is	A) -1	B) -2	C) -3	D) -4
10	The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
11	If : $\frac{X}{36} = \frac{5}{12}$ then $X =$	A) 25	B) 4	C) 15	D) 45
12	If $\frac{X-3}{X-2}$ is a rational number, then $X \neq$	A) 1	B) 2	C) 3	D) 4
13	$0.\dot{1}\dot{8} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$
14	The rational number $\frac{X+5}{X+9} = 0$, when $X =$	A) -5	B) -6	C) -7	D) -8
15	If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then $X =$	A) 2	B) 3	C) 7	D) 5
16	The rational number $\frac{X-4}{X-9} = 0$, then $X =$	A) 1	B) 2	C) 3	D) 4

Quiz	C	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then X =	A) 2	B) 3	C) 4	D) 5
2	The rational number $\frac{X-3}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
3	If $\frac{X+1}{X-5} \in \mathbb{Q}$, then X \neq	A) 3	B) 4	C) 5	D) 7
4	If $\frac{X}{Y} = 1$, then X - Y =	A) 1	B) 0	C) 3	D) 4
5	If $\frac{X-2}{X-4}$ is a rational number , then X \neq	A) 1	B) 2	C) 3	D) 4
6	$0.\dot{2}\dot{7} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
7	The rational number $\frac{X+7}{X+9} = 0$, when X =	A) - 5	B) - 6	C) - 7	D) - 8
8	$0.\dot{3} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$
9	If $\frac{X+2}{X+9} = 0$, then the value of X is	A) - 1	B) - 2	C) - 3	D) - 4
10	The necessary condition to make $\frac{X+3}{X-3}$ a rational number is X \neq	A) - 1	B) - 2	C) 3	D) 4
11	The rational number $\frac{X-7}{X-9} = 0$, then X =	A) 5	B) 6	C) 7	D) 9
12	The necessary condition to make $\frac{7}{X-5}$ a rational number is X \neq	A) - 3	B) - 5	C) 3	D) 5
13	If : $\frac{15}{X} = \frac{-3}{4}$ then X =	A) - 20	B) 4	C) 10	D) 15
14	The number $\frac{1}{X}$ is a rational, then X \neq	A) 1	B) 2	C) 3	D) zero
15	The number 0.5 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
16	If $\frac{X-9}{X-3} = 0$, then the value of X is	A) 5	B) 6	C) 7	D) 9

Quiz	D	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	The number 0.3 = (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
2	If $\frac{X-7}{5} = 0$, then the value of X is A) 5 B) 6 C) 7 D) 9	
3	The necessary condition to make $\frac{7}{X+3}$ a rational number is $X \neq$ A) -3 B) -5 C) 3 D) 5	
4	If $\frac{X}{Y} = 1$, then $6X - 6Y =$ A) 5 B) 6 C) 0 D) 9	
5	If $\frac{X-2}{X-9}$ is a rational number , then $X \neq$ A) 5 B) 6 C) 7 D) 9	
6	If : $\frac{X}{24} = \frac{5}{12}$ then $X =$ A) -20 B) 4 C) 10 D) 15	
7	The number $\frac{3}{X}$ is a rational, then $X \neq$ A) 1 B) 2 C) 3 D) zero	
8	The number 0.9 = (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
9	If $\frac{X+1}{X+9} = 0$, then the value of X is A) -1 B) -2 C) -3 D) -4	
10	The necessary condition to make $\frac{X-2}{X+2}$ a rational number is $X \neq$ A) -1 B) -2 C) 3 D) 4	
11	The rational number $\frac{X-6}{X-9} = 0$, then $X =$ A) 5 B) 6 C) 7 D) 9	
12	The necessary condition to make $\frac{7}{X-3}$ a rational number is $X \neq$ A) -3 B) -5 C) 3 D) 5	
13	The rational number $\frac{X-1}{X-9} = 0$, then $X =$ A) 1 B) 2 C) 3 D) 4	
14	If $\frac{3}{X-5} \in \mathbb{Q}$, then $X \neq$ A) 3 B) 4 C) 5 D) 7	
15	$0.\dot{1}\dot{5} =$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
16	The rational number $\frac{X+4}{X+9} = 0$, when $X =$ A) -1 B) -2 C) -3 D) -4	

Quiz	E	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	If $\frac{X}{Y} = 1$, then $3X - 3Y =$	A) 1	B) 2	C) 3	D) 0
2	If $\frac{X-2}{X-6}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
3	If : $\frac{2}{5} = \frac{X}{15}$ then $X =$	A) 25	B) 6	C) 15	D) 45
4	If $\frac{X-2}{X-1}$ is a rational number , then $X \neq$	A) 1	B) 2	C) 3	D) 4
5	The rational number $\frac{X-2}{X-9} = 0$, then $X =$	A) 1	B) 2	C) 3	D) 4
6	If $\frac{X-1}{X-5} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
7	If : $\frac{X}{72} = \frac{5}{8}$ then $X =$	A) 25	B) 4	C) 15	D) 45
8	If $\frac{X-2}{X-3}$ is a rational number , then $X \neq$	A) 1	B) 2	C) 3	D) 4
9	$0.\dot{2}\dot{1} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
10	The rational number $\frac{X+6}{X+9} = 0$, when $X =$	A) -5	B) -6	C) -7	D) -8
11	If : $X + \frac{2}{X} = 5 + \frac{2}{5}$, then $X =$	A) 2	B) 3	C) 4	D) 5
12	The rational number $\frac{X-5}{X-9} = 0$, then $X =$	A) 5	B) 6	C) 7	D) 9
13	The number $\frac{X+7}{X-5} \in \mathbb{Q}$, if $X \neq$	A) 3	B) 4	C) 5	D) 7
14	If $\frac{X}{Y} = 1$, then $9X - 9Y =$	A) 5	B) 6	C) 0	D) 9
15	If $\frac{5}{X-4} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
16	If $\frac{X}{Y} = 1$, then $4X - 4Y =$	A) 0	B) 2	C) 3	D) 4

Homework

Quiz	A	Date :		الاسم
Mark		15		توقيع ولي الأمر

1	If $\frac{X}{Y} = 1$, then $9X - 9Y =$	A) 5	B) 6	C) 0	D) 9
2	If $\frac{X-9}{X-3} = 0$, then the value of X is	A) 5	B) 6	C) 7	D) 9
3	The rational number $\frac{X+8}{X+9} = 0$, when X =	A) - 5	B) - 6	C) - 7	D) - 8
4	If $\frac{X-2}{X-3}$ is a rational number , then $X \neq$	A) 1	B) 2	C) 3	D) 4
5	If $\frac{5}{X-4} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
6	The necessary condition to make $\frac{7}{X+5}$ a rational number is $X \neq$	A) - 3	B) - 5	C) 3	D) 5
7	The number 0.7 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
8	$0.\dot{5}\dot{7} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
9	If $\frac{X}{Y} = 1$, then $X - Y =$	A) 1	B) 0	C) 3	D) 4
10	The rational number $\frac{X-1}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
11	If $\frac{X-8}{X-9} = 0$, then the value of X is	A) 5	B) 6	C) 7	D) 8
12	The rational number $\frac{X+9}{X+5} = 0$, when X =	A) - 5	B) - 6	C) - 9	D) - 8
13	If $\frac{X-2}{X-4}$ is a rational number , then $X \neq$	A) 1	B) 2	C) 3	D) 4
14	If $\frac{3}{X-5} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
15	The necessary condition to make $\frac{X-1}{X+1}$ a rational number is $X \neq$	A) - 1	B) - 2	C) 3	D) 4

Quiz B	Date : .....	.....	الاسم
Mark	.....	16	توقيع ولي الأمر

1	If $\frac{X-2}{X-7}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
2	$0.\dot{1}\dot{8} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$
3	If : $\frac{20}{X} = \frac{4}{5}$ then $X =$	A) 25	B) 4	C) 15	D) 45
4	If $\frac{X}{Y} = 1$, then $6X - 6Y =$	A) 5	B) 6	C) 0	D) 9
5	The rational number $\frac{X-6}{X-9} = 0$, then $X =$	A) 5	B) 6	C) 7	D) 9
6	The rational number $\frac{X+5}{X+9} = 0$, when $X =$	A) - 5	B) - 6	C) - 7	D) - 8
7	The number $\frac{5}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
8	If $\frac{X-2}{X-9}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 9
9	The necessary condition to make $\frac{7}{X-3}$ a rational number is $X \neq$	A) - 3	B) - 5	C) 3	D) 5
10	If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then $X =$	A) 2	B) 3	C) 7	D) 5
11	If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
12	$0.\dot{2}\dot{1} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
13	If : $\frac{2}{5} = \frac{X}{15}$ then $X =$	A) 25	B) 6	C) 15	D) 45
14	If $\frac{X}{Y} = 1$, then $7X - 7Y =$	A) 5	B) 6	C) 7	D) 0
15	The rational number $\frac{X-7}{X-9} = 0$, then $X =$	A) 5	B) 6	C) 7	D) 9
16	The rational number $\frac{X+6}{X+9} = 0$, when $X =$	A) - 5	B) - 6	C) - 7	D) - 8

Quiz	C	Date :	الاسم
Mark		16	توقيع ولي الأمر
1	If $\frac{X-2}{X-1}$ is a rational number , then $X \neq$		
	A) 1 B) 2 C) 3 D) 4		
2	If $\frac{7}{3-X} \in \mathbb{Q}$, then $X \neq$		
	A) 3 B) 4 C) 5 D) 7		
3	The necessary condition to make $\frac{7}{X-5}$ a rational number is $X \neq$		
	A) - 3 B) - 5 C) 3 D) 5		
4	If : $X + \frac{2}{X} = 5 + \frac{2}{5}$, then $X =$		
	A) 2 B) 3 C) 4 D) 5		
5	The number 0.3 = (in the rational form)		
	A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$		
6	$0.\dot{2}\dot{7} =$		
	A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$		
7	If : $\frac{X}{36} = \frac{5}{12}$ then $X =$		
	A) 25 B) 4 C) 15 D) 45		
8	If $\frac{X}{Y} = 1$, then $8X - 8Y =$		
	A) 0 B) 6 C) 7 D) 9		
9	If $\frac{X-7}{5} = 0$, then the value of X is		
	A) 5 B) 6 C) 7 D) 9		
10	The rational number $\frac{X+7}{X+9} = 0$, when $X =$		
	A) - 5 B) - 6 C) - 7 D) - 8		
11	If $\frac{X-3}{X-2}$ is a rational number , then $X \neq$		
	A) 1 B) 2 C) 3 D) 4		
12	If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$		
	A) 3 B) 4 C) 5 D) 7		
13	The necessary condition to make $\frac{7}{X+3}$ a rational number is $X \neq$		
	A) - 3 B) - 5 C) 3 D) 5		
14	The number 0.5 = (in the rational form)		
	A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$		
15	$0.5\dot{1} =$		
	A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$		
16	If : $\frac{X}{72} = \frac{5}{8}$ then $X =$		
	A) 25 B) 4 C) 15 D) 45		

Quiz	D	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	If : $\frac{15}{X} = \frac{-3}{4}$ then X =	A) - 20	B) 4	C) 10	D) 15
2	If $\frac{X}{Y} = 1$, then $2X - 2Y =$	A) 1	B) 2	C) 0	D) 4
3	The rational number $\frac{X-2}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
4	If $\frac{X+1}{X+9} = 0$, then the value of X is	A) - 1	B) - 2	C) - 3	D) - 4
5	The number $\frac{1}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
6	If $\frac{X-2}{X-5}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
7	If $\frac{X-1}{X-5} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
8	The necessary condition to make $\frac{X-2}{X+2}$ a rational number is $X \neq$	A) - 1	B) - 2	C) 3	D) 4
9	$0.\dot{3} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$
10	If : $\frac{2}{5} = \frac{X}{10}$ then X =	A) - 20	B) 4	C) 10	D) 15
11	If $\frac{X}{Y} = 1$, then $3X - 3Y =$	A) 1	B) 2	C) 3	D) 0
12	The rational number $\frac{X-3}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
13	If $\frac{X+2}{X+9} = 0$, then the value of X is	A) - 1	B) - 2	C) - 3	D) - 4
14	The number $\frac{2}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
15	If $\frac{X-2}{X-6}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
16	The number 0.9 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$

Exercises

Quiz	A	Date : .....	.....	الاسم
Mark	.....	15	.....	توقيع ولي الأمر
1	The number 0.3 = (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$			
2	$0.\dot{2}\dot{7} = \dots\dots\dots$ A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$			
3	If : $\frac{X}{72} = \frac{5}{8}$ then X = A) 25 B) 4 C) 15 D) 45			
4	The rational number $\frac{X-1}{X-9} = 0$, then X = A) 1 B) 2 C) 3 D) 4			
5	If $\frac{X+1}{X+9} = 0$, then the value of X is A) -1 B) -2 C) -3 D) -4			
6	The number $\frac{2}{X}$ is a rational, then X \neq A) 1 B) 2 C) 3 D) zero			
7	If $\frac{X-2}{X-7}$ is a rational number , then X \neq A) 5 B) 6 C) 7 D) 8			
8	The number $\frac{X+7}{X-5} \in \mathbb{Q}$, if X \neq A) 3 B) 4 C) 5 D) 7			
9	If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then X = A) 2 B) 3 C) 7 D) 5			
10	Which of the following is lies between : $\frac{7}{11}$, $\frac{7}{20}$? A) $\frac{7}{10}$ B) $|\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$			
11	If $\Delta + \square = 20$, $\Delta + \Delta + \square = 35$, then $\Delta =$ A) 5 B) 10 C) 15 D) 20			
12	$0.\dot{2}\dot{1} = \dots\dots\dots$ A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$			
13	If : $\frac{X}{36} = \frac{5}{12}$ then X = A) 25 B) 4 C) 15 D) 45			
14	If $\frac{X}{Y} = 1$, then $9X - 9Y =$ A) 5 B) 6 C) 0 D) 9			
15	If $\frac{X-8}{X-9} = 0$, then the value of X is A) 5 B) 6 C) 7 D) 8			

Quiz B	Date : .....	.....	الاسم
Mark	.....	16	توقيع ولي الأمر

1	If $\frac{3}{X-5} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
2	The necessary condition to make $\frac{X-2}{X+2}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
3	$|\frac{-2}{3}|$ ..... zero	A) >	B) <	C) =	D) \leq
4	Which of the following is the value of X which : $X < 1 < \frac{1}{X}$	A) 1	B) -1	C) 1/4	D) -1/3
5	$0.\dot{3} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$
6	If : $\frac{X}{24} = \frac{5}{12}$ then $X =$	A) -20	B) 4	C) 10	D) 15
7	If $\frac{X}{Y} = 1$, then $5X - 5Y =$	A) 5	B) 0	C) 7	D) 9
8	The rational number $\frac{X-6}{X-9} = 0$, then $X =$	A) 5	B) 6	C) 7	D) 9
9	The rational number $\frac{X+6}{X+9} = 0$, when $X =$	A) -5	B) -6	C) -7	D) -8
10	If $\frac{X-3}{X-2}$ is a rational number, then $X \neq$	A) 1	B) 2	C) 3	D) 4
11	If $\frac{5}{X-4} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
12	The necessary condition to make $\frac{X-1}{X+1}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
13	The smallest fraction of the following is	A) $\frac{1}{2}$	B) $\frac{3}{4}$	C) $\frac{5}{8}$	D) $\frac{7}{16}$
14	Which of the following is the value of X which : $X < 1 < \frac{1}{X}$	A) 1	B) -1	C) 1/3	D) -1/3
15	If $a + \frac{2}{a} = 9\frac{2}{9}$, then $a =$	A) 3	B) 5	C) 7	D) 9
16	The number 0.9 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$

Quiz	C	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	$0.\dot{1}\dot{5} = \dots\dots\dots$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
2	If : $\frac{20}{X} = \frac{4}{5}$ then X = A) 25 B) 4 C) 15 D) 45	
3	If $\frac{X}{Y} = 1$, then $7X - 7Y = \dots\dots\dots$ A) 5 B) 6 C) 7 D) 0	
4	If $\frac{X-7}{5} = 0$, then the value of X is A) 5 B) 6 C) 7 D) 9	
5	The rational number $\frac{X+8}{X+9} = 0$, when X = A) - 5 B) - 6 C) - 7 D) - 8	
6	If $\frac{X-2}{X-4}$ is a rational number , then $X \neq \dots\dots\dots$ A) 1 B) 2 C) 3 D) 4	
7	If $\frac{X-1}{X-5} \in \mathbb{Q}$, then $X \neq \dots\dots\dots$ A) 3 B) 4 C) 5 D) 7	
8	The necessary condition to make $\frac{X+3}{X-3}$ a rational number is $X \neq \dots\dots\dots$ A) - 1 B) - 2 C) 3 D) 4	
9	$|\frac{-3}{5}| \dots\dots\dots$ zero A) > B) < C) = D) \leq	
10	Which of the following is the value of X which : $X < 1 < \frac{1}{X}$ A) 1 B) -1 C) $\frac{1}{5}$ D) $-\frac{1}{3}$	
11	$0.\dot{6} = \dots\dots\dots$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
12	If : $\frac{X}{24} = \frac{5}{8}$ then X = A) - 20 B) 4 C) 10 D) 15	
13	If $\frac{X}{Y} = 1$, then $6X - 6Y = \dots\dots\dots$ A) 5 B) 6 C) 0 D) 9	
14	The rational number $\frac{X-7}{X-9} = 0$, then X = A) 5 B) 6 C) 7 D) 9	
15	The rational number $\frac{X+7}{X+9} = 0$, when X = A) - 5 B) - 6 C) - 7 D) - 8	
16	If $\frac{X-2}{X-3}$ is a rational number , then $X \neq \dots\dots\dots$ A) 1 B) 2 C) 3 D) 4	

Quiz	D	Date : .....	.....	الاسم
Mark	.....	17	.....	توقيع ولي الأمر

1	The number $\frac{1}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
2	If $\frac{X-2}{X-6}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
3	The number $\frac{X+7}{X-7} \in \mathbb{Q}$, if $X \neq$	A) 3	B) 4	C) 5	D) 7
4	If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then $X =$	A) 2	B) 3	C) 4	D) 5
5	$|\frac{-2}{7}|$ ..... zero	A) >	B) <	C) =	D) \leq
6	If $\Delta + \square = 20$, $\Delta + \Delta + \square = 30$, then $\Delta =$	A) 5	B) 10	C) 15	D) 20
7	$0.\dot{1}\dot{8} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$
8	If $\Delta + \square = 25$, $\Delta + \Delta + \square = 45$, then $\Delta =$	A) 5	B) 10	C) 15	D) 20
9	If : $\frac{2}{5} = \frac{X}{15}$ then $X =$	A) 25	B) 4	C) 15	D) 45
10	If $\frac{X}{Y} = 1$, then $8X - 8Y =$	A) 0	B) 6	C) 7	D) 9
11	If $\frac{X-9}{X-3} = 0$, then the value of X is	A) 5	B) 6	C) 7	D) 9
12	The rational number $\frac{X+9}{X+5} = 0$, when $X =$	A) -5	B) -6	C) -9	D) -8
13	If $\frac{X-2}{X-5}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
14	If $\frac{X+1}{X-5} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
15	The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
16	$|\frac{-3}{2}|$ ..... zero	A) >	B) <	C) =	D) \leq
17	If $\Delta + \square = 20$, $\Delta + \Delta + \square = 25$, then $\Delta =$	A) 5	B) 10	C) 15	D) 20

Quiz	E	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	If : $\frac{2}{5} = \frac{X}{10}$ then X = A) - 20 B) 4 C) 10 D) 15	
2	If $\frac{X}{Y} = 1$, then $4X - 4Y =$ A) 0 B) 2 C) 3 D) 4	
3	The rational number $\frac{X-5}{X-9} = 0$, then X = A) 5 B) 6 C) 7 D) 9	
4	The rational number $\frac{X+5}{X+9} = 0$, when X = A) - 5 B) - 6 C) - 7 D) - 8	
5	If $\frac{X-2}{X-1}$ is a rational number , then $X \neq$ A) 1 B) 2 C) 3 D) 4	
6	If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$ A) 3 B) 4 C) 5 D) 7	
7	The necessary condition to make $\frac{7}{X+5}$ a rational number is $X \neq$ A) - 3 B) - 5 C) 3 D) 5	
8	The smallest fraction of the following is A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{16}$ D) $\frac{7}{16}$	
9	Which of the following is the value of X which : $X < 1 < \frac{1}{X}$ A) 1 B) -1 C) 1/2 D) - 1/3	
10	If $a + \frac{2}{a} = 7\frac{2}{7}$, then a = A) 3 B) 5 C) 7 D) 9	
11	The number 0.7 = (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
12	If : $\frac{15}{X} = \frac{-3}{4}$ then X = A) - 20 B) 4 C) 10 D) 15	
13	If $\frac{X}{Y} = 1$, then $3X - 3Y =$ A) 1 B) 2 C) 3 D) 0	
14	The rational number $\frac{X-4}{X-9} = 0$, then X = A) 1 B) 2 C) 3 D) 4	
15	The rational number $\frac{X+4}{X+9} = 0$, when X = A) - 1 B) - 2 C) - 3 D) - 4	
16	The number $\frac{5}{X}$ is a rational, then $X \neq$ A) 1 B) 2 C) 3 D) zero	

Homework

Quiz	A	Date :		الاسم
Mark		15		توقيع ولي الأمر

1	If $\frac{7}{3-X} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
2	The necessary condition to make $\frac{7}{X+3}$ a rational number is $X \neq$	A) - 3	B) - 5	C) 3	D) 5
3	The smallest fraction of the following is	A) $\frac{1}{2}$	B) $\frac{3}{40}$	C) $\frac{5}{8}$	D) $\frac{7}{16}$
4	Which of the following is lies between : $\frac{7}{10}$, $\frac{7}{14}$?	A) $\frac{7}{10}$	B) $|- \frac{7}{11}|$	C) $\frac{7}{15}$	D) $\frac{7}{22}$
5	If $a + \frac{2}{a} = 5\frac{2}{5}$, then $a =$	A) 3	B) 5	C) 7	D) 9
6	The number 0.5 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
7	$0.\dot{5}\dot{7} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
8	If $\frac{X}{Y} = 1$, then $2X - 2Y =$	A) 1	B) 2	C) 0	D) 4
9	The rational number $\frac{X-3}{X-9} = 0$, then $X =$	A) 1	B) 2	C) 3	D) 4
10	If $\frac{X+3}{X+9} = 0$, then the value of X is	A) - 1	B) - 2	C) - 3	D) - 4
11	The number $\frac{4}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
12	If $\frac{X-2}{X-9}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 9
13	The necessary condition to make $\frac{7}{X-5}$ a rational number is $X \neq$	A) - 3	B) - 5	C) 3	D) 5
14	If $\Delta + \square = 20$, $\Delta + \Delta + \square = 25$, then $\Delta =$	A) 5	B) 10	C) 15	D) 20
15	The smallest fraction of the following is	A) $\frac{1}{12}$	B) $\frac{3}{4}$	C) $\frac{5}{8}$	D) $\frac{7}{16}$

Quiz B	Date : .....	.....	الاسم
Mark	.....	15	توقيع ولي الأمر

1	Which of the following is lies between : $\frac{7}{9}$, $\frac{7}{11}$?	A) $\frac{7}{10}$	B) $|\frac{7}{11}|$	C) $\frac{7}{15}$	D) $\frac{7}{22}$
2	If $a + \frac{2}{a} = 3\frac{2}{3}$, then a =	A) 3	B) 5	C) 7	D) 9
3	$0.\dot{5}\dot{1} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
4	If $\frac{X}{Y} = 1$, then $X - Y =$	A) 1	B) 0	C) 3	D) 4
5	The rational number $\frac{X-2}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
6	If $\frac{X+2}{X+9} = 0$, then the value of X is	A) -1	B) -2	C) -3	D) -4
7	The number $\frac{3}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
8	If $\frac{X-2}{X-8}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
9	The necessary condition to make $\frac{7}{X-3}$ a rational number is $X \neq$	A) -3	B) -5	C) 3	D) 5
10	If : $X + \frac{2}{X} = 5 + \frac{2}{5}$, then X =	A) 2	B) 3	C) 4	D) 5
11	Which of the following is lies between : $\frac{7}{20}$, $\frac{7}{25}$?	A) $\frac{7}{10}$	B) $|\frac{7}{11}|$	C) $\frac{7}{15}$	D) $\frac{7}{22}$
12	The number 0.3 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
13	If $\frac{X+1}{X+9} = 0$, then the value of X is	A) -1	B) -2	C) -3	D) -4
14	Which of the following is lies between : $\frac{7}{11}$, $\frac{7}{20}$?	A) $\frac{7}{10}$	B) $|\frac{7}{11}|$	C) $\frac{7}{15}$	D) $\frac{7}{22}$
15	If $\frac{X-8}{X-9} = 0$, then the value of X is	A) 5	B) 6	C) 7	D) 8

Quiz	C	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	$|\frac{-2}{7}|$ ..... zero A) > B) < C) = D) \leq	
2	If $\frac{X-9}{X-3} = 0$, then the value of X is A) 5 B) 6 C) 7 D) 9	
3	$|\frac{-3}{2}|$ ..... zero A) > B) < C) = D) \leq	
4	If $\frac{X-7}{5} = 0$, then the value of X is A) 5 B) 6 C) 7 D) 9	
5	$|\frac{-3}{5}|$ ..... zero A) > B) < C) = D) \leq	
6	The rational number $\frac{X-7}{X-9} = 0$, then X = A) 5 B) 6 C) 7 D) 9	
7	$|\frac{-2}{3}|$ ..... zero A) > B) < C) = D) \leq	
8	The rational number $\frac{X-6}{X-9} = 0$, then X = A) 5 B) 6 C) 7 D) 9	
9	The smallest fraction of the following is A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{8}$ D) $\frac{7}{16}$	
10	If $\frac{X}{Y} = 1$, then $4X - 4Y =$ A) 0 B) 2 C) 3 D) 4	
11	The necessary condition to make $\frac{7}{X+5}$ a rational number is $X \neq$ A) -3 B) -5 C) 3 D) 5	
12	If : $\frac{15}{X} = \frac{-3}{4}$ then X = A) -20 B) 4 C) 10 D) 15	
13	If $\frac{7}{3-X} \in \mathbb{Q}$, then $X \neq$ A) 3 B) 4 C) 5 D) 7	
14	The number 0.5 = (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
15	The number $\frac{4}{X}$ is a rational, then $X \neq$ A) 1 B) 2 C) 3 D) zero	
16	If $a + \frac{2}{a} = 3\frac{2}{3}$, then a = A) 3 B) 5 C) 7 D) 9	

Quiz	D	Date :		الاسم
Mark		17		توقيع ولي الأمر

1	The number $\frac{3}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
2	If $\Delta + \square = 25$, $\Delta + \Delta + \square = 45$, then $\Delta =$	A) 5	B) 10	C) 15	D) 20
3	The rational number $\frac{X-1}{X-9} = 0$, then $X =$	A) 1	B) 2	C) 3	D) 4
4	If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then $X =$	A) 2	B) 3	C) 7	D) 5
5	If $\frac{X}{Y} = 1$, then $9X - 9Y =$	A) 5	B) 6	C) 0	D) 9
6	If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then $X =$	A) 2	B) 3	C) 4	D) 5
7	If $\frac{X}{Y} = 1$, then $8X - 8Y =$	A) 0	B) 6	C) 7	D) 9
8	The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
9	If $\frac{X}{Y} = 1$, then $7X - 7Y =$	A) 5	B) 6	C) 7	D) 0
10	The necessary condition to make $\frac{X+3}{X-3}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
11	If $\frac{X}{Y} = 1$, then $6X - 6Y =$	A) 5	B) 6	C) 0	D) 9
12	The necessary condition to make $\frac{X-2}{X+2}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
13	If $\frac{X}{Y} = 1$, then $5X - 5Y =$	A) 5	B) 0	C) 7	D) 9
14	The necessary condition to make $\frac{X-1}{X+1}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
15	If : $\frac{2}{5} = \frac{X}{10}$ then $X =$	A) -20	B) 4	C) 10	D) 15
16	If $\Delta + \square = 20$, $\Delta + \Delta + \square = 30$, then $\Delta =$	A) 5	B) 10	C) 15	D) 20
17	If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7

Quiz	E	Date : .....	.....	الاسم
Mark	.....	9	.....	توقيع ولي الأمر

1	The number 0.7 = (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
2	The number $\frac{5}{x}$ is a rational, then $x \neq$ A) 1 B) 2 C) 3 D) zero	
3	If $a + \frac{2}{a} = 5\frac{2}{5}$, then $a =$ A) 3 B) 5 C) 7 D) 9	
4	If $\frac{x+3}{x+9} = 0$, then the value of x is A) - 1 B) - 2 C) - 3 D) - 4	
5	Which of the following is lies between : $\frac{7}{9}$, $\frac{7}{11}$? A) $\frac{7}{10}$ B) $|\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$	
6	If $\frac{x+2}{x+9} = 0$, then the value of x is A) - 1 B) - 2 C) - 3 D) - 4	
7	Which of the following is lies between : $\frac{7}{20}$, $\frac{7}{25}$? A) $\frac{7}{10}$ B) $|\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$	
8	If : $\frac{x}{72} = \frac{5}{8}$ then $x =$ A) 25 B) 4 C) 15 D) 45	
9	The number $\frac{x+7}{x-5} \in \mathbb{Q}$, if $x \neq$ A) 3 B) 4 C) 5 D) 7	

[C] : Essay Problems : -

1	Arrange in an descending order : $-\frac{1}{10}$, $\frac{4}{15}$, -2 , $-\frac{3}{5}$, 2018 Exam (10) Question (3) (b)	
2	Find three rational numbers lying between : $\frac{1}{4}$ and $\frac{1}{5}$ 2018 Exam (10) Question (4) (a)	
3	Find three rational numbers that are lying between : $\frac{1}{5}$ and $\frac{1}{3}$ 2018 Exam (15) Question (3) (b)	
4	Find two rational numbers between : $\frac{2}{3}$ and $\frac{3}{7}$ 2018 Exam (1) Question (4) (b)	
5	Find three rational numbers lying between : $\frac{1}{3}$ and $\frac{3}{4}$ such that one of them is an integer 2018 Exam (13) Question (3) (b)	

Exercises

Quiz	A	Date : .....	.....	الاسم
Mark	.....	15	.....	توقيع ولي الأمر

1	The remainder of $\frac{3}{4}$ from $\frac{21}{28}$ is	A) 2	B) 0	C) 1	D) -1
2	$\frac{1}{2} + \frac{1}{3} =$	A) $\frac{5}{6}$	B) $\frac{1}{15}$	C) $\frac{5}{4}$	D) $\frac{-2}{21}$
3	$\frac{-3}{5} + \frac{2}{3} =$	A) $\frac{5}{6}$	B) $\frac{1}{15}$	C) $\frac{5}{4}$	D) $\frac{-2}{21}$
4	$\frac{1}{2} + \frac{3}{4} =$	A) $\frac{5}{6}$	B) $\frac{1}{15}$	C) $\frac{5}{4}$	D) $\frac{-2}{21}$
5	$\frac{-2}{3} + \frac{4}{7} =$	A) $\frac{5}{6}$	B) $\frac{1}{15}$	C) $\frac{5}{4}$	D) $\frac{-2}{21}$
6	$0.18 - 3\% =$	A) 0.15	B) -0.12	C) -0.15	D) 0.12
7	$0.18 - 30\% =$	A) 0.15	B) -0.12	C) -0.15	D) 0.12
8	$0.15 - 3\% =$	A) 0.15	B) -0.12	C) -0.15	D) 0.12
9	$0.15 - 30\% =$	A) 0.15	B) -0.12	C) -0.15	D) 0.12
10	$\frac{3X}{7} - \frac{X}{7} =$	A) $\frac{2}{7}$	B) $\frac{2X}{7}$	C) $\frac{3X}{7}$	D) $\frac{4X}{7}$
11	$\frac{4X}{7} - \frac{X}{7} =$	A) $\frac{3}{7}$	B) $\frac{2X}{7}$	C) $\frac{3X}{7}$	D) $\frac{4X}{7}$
12	$\frac{5X}{7} - \frac{X}{7} =$	A) $\frac{24}{7}$	B) $\frac{2X}{7}$	C) $\frac{3X}{7}$	D) $\frac{4X}{7}$
13	$\frac{6X}{7} - \frac{X}{7} =$	A) $\frac{5}{7}$	B) $\frac{5X}{7}$	C) $\frac{3X}{7}$	D) $\frac{4X}{7}$
14	$-|-7/2|$ ..... The additive of $7/2$	A) <	B) >	C) =	
15	$|-7/2|$ ..... The additive of $7/2$	A) <	B) >	C) =	

Quiz	B	Date :		الاسم
Mark		17		توقيع ولي الأمر

1	The additive inverse of : $\frac{9}{25} \times (-5)^2$ is	A) - 7	B) 7	C) - 9	D) 9
2	The additive inverse of : $\frac{-9}{25} \times (-5)^2$ is	A) - 7	B) 7	C) - 9	D) 9
3	The additive inverse of : $\frac{-9}{-7}$ is	A) - 9/7	B) 9/7	C) -7/9	D) 7/9
4	The additive inverse of : $\frac{-7}{-9}$ is	A) - 9/7	B) 9/7	C) -7/9	D) 7/9
5	The value of $|1| + |-6| =$ .....	A) 5	B) 6	C) 7	D) 8
6	The value of $|1| + |-7| =$ .....	A) 5	B) 6	C) 7	D) 8
7	The value of $|-8| - |-6| =$ .....	A) 2	B) 3	C) 4	D) 5
8	The value of $|-8| - |-5| =$ .....	A) 2	B) 3	C) 4	D) 5
9	The value of $|-8| - |-4| =$ .....	A) 2	B) 3	C) 4	D) 5
10	The value of $|-8| - |-3| =$ .....	A) 2	B) 3	C) 4	D) 5
11	The value of $|-9| - |-4| =$ .....	A) 5	B) 6	C) 7	D) 8
12	The value of $|-9| - |-3| =$ .....	A) 5	B) 6	C) 7	D) 8
13	The value of $|-9| - |-2| =$ .....	A) 5	B) 6	C) 7	D) 8
14	The value of $|-9| - |-1| =$ .....	A) 5	B) 6	C) 7	D) 8
15	The remainder of $\frac{1}{3}$ from $\frac{3}{9}$ is	A) 2	B) 0	C) 1	D) - 1
16	The remainder of $\frac{2}{3}$ from $\frac{6}{9}$ is	A) 2	B) 0	C) 1	D) - 1
17	The remainder of $\frac{1}{2}$ from $\frac{7}{14}$ is	A) 2	B) 0	C) 1	D) - 1

Quiz	C	Date : .....	.....	الاسم
Mark	.....	13	.....	توقيع ولي الأمر

1	The additive inverse of : $(\frac{4}{9})^{\text{zero}}$ is	A) 0	B) 1	C) - 1	D) 2
2	The additive inverse of : $(\frac{7}{5})^{\text{zero}}$ is	A) 0	B) 1	C) - 1	D) 2
3	The additive inverse of : $(\frac{1}{2})^2$ is	A) 0	B) 1	C) - 1	D) 2
4	The additive inverse of : $(\frac{1}{3})^2$ is	A) $-\frac{1}{4}$	B) $-\frac{1}{9}$	C) $-\frac{4}{9}$	D) $-\frac{4}{25}$
5	The additive inverse of : $(-\frac{2}{3})^2$ is	A) $-\frac{1}{4}$	B) $-\frac{1}{9}$	C) $-\frac{4}{9}$	D) $-\frac{4}{25}$
6	The additive inverse of : $(-\frac{2}{5})^2$ is	A) $-\frac{1}{4}$	B) $-\frac{1}{9}$	C) $-\frac{4}{9}$	D) $-\frac{4}{25}$
7	The additive inverse of the number is itself	A) 0	B) 1	C) - 1	D) 2
8	The additive inverse of : $\frac{1}{|-5|}$ is	A) $-\frac{1}{5}$	B) $-\frac{1}{2}$	C) $\frac{1}{5}$	D) $\frac{1}{2}$
9	The additive inverse of : $|\frac{1}{2}|$ is	A) $-\frac{1}{5}$	B) $-\frac{1}{2}$	C) $\frac{1}{5}$	D) $\frac{1}{2}$
10	The additive inverse of : $\frac{-1}{|-5|}$ is	A) $-\frac{1}{5}$	B) $-\frac{1}{2}$	C) $\frac{1}{5}$	D) $\frac{1}{2}$
11	The additive inverse of : $\frac{-1}{|-2|}$ is	A) $-\frac{1}{5}$	B) $-\frac{1}{2}$	C) $\frac{1}{5}$	D) $\frac{1}{2}$
12	The additive inverse of : $\frac{7}{25} \times (-5)^2$ is	A) - 7	B) 7	C) - 9	D) 9
13	The additive inverse of : $\frac{-7}{25} \times (-5)^2$ is	A) - 7	B) 7	C) - 9	D) 9

Quiz	D	Date : .....	.....	الاسم
Mark	.....	15	.....	توقيع ولي الأمر

1	The additive identity element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
2	The additive neutral element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
3	The additive inverse of zero is	A) 0	B) -5	C) 2	D) 5
4	The additive inverse of : $|-2|$ is	A) -2	B) -5	C) 2	D) 5
5	The additive inverse of : $|-5|$ is	A) -2	B) -5	C) 2	D) 5
6	The additive inverse of : $-|-2|$ is	A) -2	B) -5	C) 2	D) 5
7	The additive inverse of : $-|-5|$ is	A) -2	B) -5	C) 2	D) 5
8	The additive inverse of : $(-\frac{3}{4})$ is	A) $\frac{3}{4}$	B) $-\frac{3}{4}$	C) $\frac{4}{5}$	D) $-\frac{4}{5}$
9	The additive inverse of : $(\frac{3}{4})$ is	A) $\frac{3}{4}$	B) $-\frac{3}{4}$	C) $\frac{4}{5}$	D) $-\frac{4}{5}$
10	The additive inverse of : $(-\frac{4}{5})$ is	A) $\frac{3}{4}$	B) $-\frac{3}{4}$	C) $\frac{4}{5}$	D) $-\frac{4}{5}$
11	The additive inverse of : $(\frac{4}{5})$ is	A) $\frac{3}{4}$	B) $-\frac{3}{4}$	C) $\frac{4}{5}$	D) $-\frac{4}{5}$
12	The additive inverse of : $(\frac{4}{5})^{\text{zero}}$ is	A) 0	B) 1	C) -1	D) 2
13	The additive inverse of : $(-\frac{2}{7})^{\text{zero}}$ is	A) 0	B) 1	C) -1	D) 2
14	The additive inverse of : $(-\frac{4}{5})^{\text{zero}}$ is	A) 0	B) 1	C) -1	D) 2
15	The additive inverse of : $(-\frac{4}{11})^{\text{zero}}$ is	A) 0	B) 1	C) -1	D) 2

Quiz	E	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	$-|7/2|$ ..... The additive of $7/2$ A) < B) > C) =	
2	If $A + \frac{3}{5} = 0$, then $A =$ A) $3/5$ B) $-3/5$ C) $-5/3$ D) $5/3$	
3	If $A - \frac{3}{5} = 0$, then $A =$ A) $3/5$ B) $-3/5$ C) $-5/3$ D) $5/3$	
4	If $A + \frac{5}{3} = 0$, then $A =$ A) $3/5$ B) $-3/5$ C) $-5/3$ D) $5/3$	
5	If $A - \frac{5}{3} = 0$, then $A =$ A) $3/5$ B) $-3/5$ C) $-5/3$ D) $5/3$	
6	The number $0.3 =$ (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
7	The number $0.5 =$ (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
8	The number $0.7 =$ (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
9	The number $0.9 =$ (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
10	$0.\dot{3} =$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
11	$0.1\dot{5} =$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
12	$0.1\dot{8} =$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
13	$0.5\dot{7} =$ A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$	
14	If : $\frac{15}{X} = \frac{-3}{4}$ then $X =$ A) -20 B) 4 C) 10 D) 15	
15	If : $\frac{2}{5} = \frac{X}{10}$ then $X =$ A) -20 B) 4 C) 10 D) 15	
16	If : $\frac{X}{24} = \frac{5}{12}$ then $X =$ A) -20 B) 4 C) 10 D) 15	

Homework

Quiz	A	Date : .....	.....	الاسم
Mark	.....	15	.....	توقيع ولي الأمر

1	If : $\frac{X}{24} = \frac{5}{8}$ then X =	A) - 20	B) 4	C) 10	D) 15
2	If $\frac{X}{Y} = 1$, then $2X - 2Y =$	A) 1	B) 2	C) 0	D) 4
3	If $\frac{X}{Y} = 1$, then $3X - 3Y =$	A) 1	B) 2	C) 3	D) 0
4	If $\frac{X}{Y} = 1$, then $4X - 4Y =$	A) 0	B) 2	C) 3	D) 4
5	The rational number $\frac{X-1}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
6	The rational number $\frac{X-2}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
7	The rational number $\frac{X-3}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
8	The rational number $\frac{X-4}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
9	The number $\frac{2}{X}$ is a rational, then X \neq	A) 1	B) 2	C) 3	D) zero
10	The number $\frac{3}{X}$ is a rational, then X \neq	A) 1	B) 2	C) 3	D) zero
11	The number $\frac{4}{X}$ is a rational, then X \neq	A) 1	B) 2	C) 3	D) zero
12	If $\frac{X-2}{X-7}$ is a rational number , then X \neq	A) 5	B) 6	C) 7	D) 8
13	If $\frac{X-2}{X-8}$ is a rational number , then X \neq	A) 5	B) 6	C) 7	D) 8
14	If $\frac{X-2}{X-9}$ is a rational number , then X \neq	A) 5	B) 6	C) 7	D) 9
15	If $\frac{7}{3-X} \in \mathbb{Q}$, then X \neq	A) 3	B) 4	C) 5	D) 7

Quiz B	Date : .....	.....	الاسم
Mark	.....	16	توقيع ولي الأمر

1	If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
2	The necessary condition to make $\frac{X-2}{X+2}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
3	The necessary condition to make $\frac{X+3}{X-3}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
4	The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$	A) -1	B) -2	C) 3	D) 4
5	If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then $X =$	A) 2	B) 3	C) 4	D) 5
6	The additive identity element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
7	The value of $|-8| - |-4| =$ .....	A) 2	B) 3	C) 4	D) 5
8	$0.\dot{5}\dot{7} =$	A) $\frac{7}{33}$	B) $\frac{3}{11}$	C) $\frac{17}{33}$	D) $\frac{19}{33}$
9	The additive inverse of : $(-\frac{4}{5})$ zero is	A) 0	B) 1	C) -1	D) 2
10	$\frac{-2}{3} + \frac{4}{7} =$	A) $\frac{5}{6}$	B) $\frac{1}{15}$	C) $\frac{5}{4}$	D) $\frac{-2}{21}$
11	The number $\frac{3}{X}$ is a rational, then $X \neq$	A) 1	B) 2	C) 3	D) zero
12	The additive inverse of : $\frac{7}{25} \times (-5)^2$ is	A) -7	B) 7	C) -9	D) 9
13	If $A - \frac{3}{5} = 0$, then $A =$	A) $\frac{3}{5}$	B) $-\frac{3}{5}$	C) $-\frac{5}{3}$	D) $\frac{5}{3}$
14	The additive inverse of : $|-2|$ is	A) -2	B) -5	C) 2	D) 5
15	The value of $|-9| - |-3| =$ .....	A) 5	B) 6	C) 7	D) 8
16	If : $\frac{X}{24} = \frac{5}{12}$ then $X =$	A) -20	B) 4	C) 10	D) 15

Quiz	C	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	The additive inverse of : $(\frac{7}{5})^{\text{zero}}$ is	A) 0	B) 1	C) - 1	D) 2
2	$0.15 - 3\% =$	A) 0.15	B) - 0.12	C) - 0.15	D) 0.12
3	If $\frac{X-2}{X-8}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 8
4	The additive inverse of : $\frac{-9}{25} \times (-5)^2$ is	A) - 7	B) 7	C) - 9	D) 9
5	The number 0.3 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
6	The additive inverse of : $-|-5|$ is	A) - 2	B) - 5	C) 2	D) 5
7	The remainder of $\frac{1}{3}$ from $\frac{3}{9}$ is	A) 2	B) 0	C) 1	D) - 1
8	If $\frac{X}{Y} = 1$, then $3X - 3Y =$	A) 1	B) 2	C) 3	D) 0
9	The additive inverse of : $(-\frac{2}{3})^2$ is	A) $-\frac{1}{4}$	B) $-\frac{1}{9}$	C) $-\frac{4}{9}$	D) $-\frac{4}{25}$
10	$\frac{4X}{7} - \frac{X}{7} =$	A) $\frac{3}{7}$	B) $\frac{2X}{7}$	C) $\frac{3X}{7}$	D) $\frac{4X}{7}$
11	If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
12	The value of $|1| + |-6| =$ .....	A) 5	B) 6	C) 7	D) 8
13	The number 0.9 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
14	The additive inverse of : $(-\frac{4}{5})$ is	A) $\frac{3}{4}$	B) $-\frac{3}{4}$	C) $\frac{4}{5}$	D) $-\frac{4}{5}$
15	The remainder of $\frac{3}{4}$ from $\frac{21}{28}$ is	A) 2	B) 0	C) 1	D) - 1
16	The rational number $\frac{X-2}{X-9} = 0$, then $X =$	A) 1	B) 2	C) 3	D) 4

Quiz	D	Date : .....	.....	الاسم
Mark	.....	25	.....	توقيع ولي الأمر

1	$-|-7/2|$ ..... The additive of $7/2$ A) < B) > C) =	
2	The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$ A) -1 B) -2 C) 3 D) 4	
3	The value of $|-8| - |-5| =$ ..... A) 2 B) 3 C) 4 D) 5	
4	$0.\dot{1}\dot{8} =$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
5	The additive inverse of : $(-\frac{2}{7})^{\text{zero}}$ is A) 0 B) 1 C) -1 D) 2	
6	$\frac{1}{2} + \frac{3}{4} =$ A) $\frac{5}{6}$ B) $\frac{1}{15}$ C) $\frac{5}{4}$ D) $\frac{-2}{21}$	
7	The number $\frac{2}{X}$ is a rational, then $X \neq$ A) 1 B) 2 C) 3 D) zero	
8	The additive inverse of : $\frac{-1}{|-2|}$ is A) $\frac{-1}{5}$ B) $\frac{-1}{2}$ C) $\frac{1}{5}$ D) $\frac{1}{2}$	
9	If $A + \frac{3}{5} = 0$, then A = A) $3/5$ B) $-3/5$ C) $-5/3$ D) $5/3$	
10	The additive inverse of zero is A) 0 B) -5 C) 2 D) 5	
11	The value of $|-9| - |-4| =$ ..... A) 5 B) 6 C) 7 D) 8	
12	If : $\frac{2}{5} = \frac{X}{10}$ then X = A) -20 B) 4 C) 10 D) 15	
13	The additive inverse of : $(\frac{4}{9})^{\text{zero}}$ is A) 0 B) 1 C) -1 D) 2	
14	$0.18 - 30\% =$ A) 0.15 B) -0.12 C) -0.15 D) 0.12	
15	If $\frac{X-2}{X-7}$ is a rational number, then $X \neq$ A) 5 B) 6 C) 7 D) 8	
16	The additive inverse of : $\frac{9}{25} \times (-5)^2$ is A) -7 B) 7 C) -9 D) 9	

17	If $A - \frac{5}{3} = 0$, then $A =$	A) $\frac{3}{5}$	B) $-\frac{3}{5}$	C) $-\frac{5}{3}$	D) $\frac{5}{3}$
18	The additive inverse of : $-|-2|$ is	A) -2	B) -5	C) 2	D) 5
19	The value of $|-9| - |-1| =$ .....	A) 5	B) 6	C) 7	D) 8
20	If $\frac{X}{Y} = 1$, then $2X - 2Y =$	A) 1	B) 2	C) 0	D) 4
21	The additive inverse of : $(\frac{1}{3})^2$ is	A) $-\frac{1}{4}$	B) $-\frac{1}{9}$	C) $-\frac{4}{9}$	D) $-\frac{4}{25}$
22	$\frac{3X}{7} - \frac{X}{7} =$	A) $\frac{2}{7}$	B) $\frac{2X}{7}$	C) $\frac{3X}{7}$	D) $\frac{4X}{7}$
23	If $\frac{7}{3-X} \in \mathbb{Q}$, then $X \neq$	A) 3	B) 4	C) 5	D) 7
24	The additive inverse of : $-\frac{7}{-9}$ is	A) $-\frac{9}{7}$	B) $\frac{9}{7}$	C) $-\frac{7}{9}$	D) $\frac{7}{9}$
25	The number $0.7 =$ (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$

[C] : Essay Problems : -

1	If the two rational numbers $\frac{3X}{4}$ and $\frac{2}{3}$ are equal, find the value of X : 2016 Exam (3) Question (4) (a)
2	Find in the simplest form the value of each of the following : 1) $15\frac{1}{4} + 12\frac{1}{2}$ 2) $0.\dot{1}\dot{8} - 25\%$ 2016 Exam (12) Question (3) (a)
3	Use properties of addition of rational numbers to calculate the value of : $\frac{5}{4} - (-\frac{13}{5}) + \frac{15}{4} - \frac{3}{5}$ 2018 Exam (3) Question (3) (a)
4	Find the value of : $-13\frac{7}{8} - (-6\frac{7}{8})$ 2018 Exam (3) Question (4) (a)
5	If $a = \frac{7}{4}$, $b = -\frac{1}{2}$, find the value of the expression : $(a - b) + (a + b)$ 2018 Exam (6) Question (3) (b)

Exercises

Quiz	A	Date : .....	.....	الاسم
Mark	.....	17	.....	توقيع ولي الأمر
1	The quotient of dividing $2.25 \div 1.5 =$			
	A) 1.5	B) 0.15	C) 15	D) 150
2	The quotient of dividing $22.5 \div 1.5 =$			
	A) 1.5	B) 0.15	C) 15	D) 150
3	The quotient of dividing $225 \div 1.5 =$			
	A) 1.5	B) 0.15	C) 15	D) 150
4	The quotient of dividing $0.225 \div 1.5 =$			
	A) 1.5	B) 0.15	C) 15	D) 150
5	$Zero \div (15) =$			
	A) 1.5	B) 0.15	C) 15	D) zero
6	$Zero \div (-25) =$			
	A) 1.5	B) 0.15	C) 15	D) zero
7	$Zero \div (-36) =$			
	A) 1.5	B) 0.15	C) 15	D) zero
8	$Zero \div (78) =$			
	A) 1.5	B) 0.15	C) 15	D) zero
9	$|-5| + 2 \times 3 - |1| =$ .....			
	A) 10	B) 9	C) 8	D) 7
10	$|-5| + 2 \times 3 - |2| =$ .....			
	A) 10	B) 9	C) 8	D) 7
11	$|-5| + 2 \times 3 - |3| =$ .....			
	A) 10	B) 9	C) 8	D) 7
12	$|-5| + 2 \times 3 - |4| =$ .....			
	A) 10	B) 9	C) 8	D) 7
13	$1/3$ of 27 is			
	A) 9	B) 3	C) 8	D) 4
14	$1/9$ of 27 is			
	A) 9	B) 3	C) 8	D) 4
15	$1/3$ of 24 is			
	A) 9	B) 3	C) 8	D) 4
16	$1/6$ of 24 is			
	A) 9	B) 3	C) 8	D) 4
17	The number which has no multiplicative inverse			
	A) 0	B) 1	C) -1	D) 2

Quiz	B	Date : .....	.....	الاسم
Mark	.....	15	.....	توقيع ولي الأمر

1	The rational number which has no multiplicative inverse	A) 0	B) 1	C) -1	D) 2
2	The multiplicative identity element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
3	The multiplicative neutral element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
4	The multiplicative inverse of 1 is	A) 0	B) 1	C) -1	D) 2
5	The multiplicative inverse of -1 is	A) 0	B) 1	C) -1	D) 2
6	The multiplicative inverse of $(\frac{-2}{3})^2$ is	A) 4/9	B) 9/4	C) -1	D) 1
7	The multiplicative inverse of $(\frac{1}{2})^0$ is	A) 0	B) 1	C) -1	D) 2
8	The multiplicative inverse of 0.5 is	A) 0	B) 1	C) -1	D) 2
9	The multiplicative inverse of $\frac{3}{2}$ is	A) $\frac{2}{3}$	B) $\frac{5}{3}$	C) $\frac{2}{7}$	D) $\frac{7}{2}$
10	The multiplicative inverse of $\frac{3}{5}$ is	A) $\frac{2}{3}$	B) $\frac{5}{3}$	C) $\frac{2}{7}$	D) $\frac{7}{2}$
11	The multiplicative inverse of $\frac{7}{2}$ is	A) $\frac{2}{3}$	B) $\frac{5}{3}$	C) $\frac{2}{7}$	D) $\frac{7}{2}$
12	The multiplicative inverse of $\frac{2}{7}$ is	A) $\frac{2}{3}$	B) $\frac{5}{3}$	C) $\frac{2}{7}$	D) $\frac{7}{2}$
13	The multiplicative inverse of $\frac{-2}{7}$ is	A) $\frac{-7}{2}$	B) $\frac{-2}{7}$	C) $\frac{-3}{5}$	D) $\frac{-5}{3}$
14	The quotient of dividing $225 \div 1.5 =$	A) 1.5	B) 0.15	C) 15	D) 150
15	The multiplicative inverse of $\frac{-7}{2}$ is	A) $\frac{-7}{2}$	B) $\frac{-2}{7}$	C) $\frac{-3}{5}$	D) $\frac{-5}{3}$

Quiz	C	Date : .....	.....	الاسم
Mark	.....	14	.....	توقيع ولي الأمر

1	The multiplicative inverse of $-\frac{5}{3}$ is	A) $-\frac{7}{2}$	B) $-\frac{2}{7}$	C) $-\frac{3}{5}$	D) $-\frac{5}{3}$
2	The multiplicative inverse of $-\frac{3}{5}$ is	A) $-\frac{7}{2}$	B) $-\frac{2}{7}$	C) $-\frac{3}{5}$	D) $-\frac{5}{3}$
3	The multiplicative inverse of $1\frac{1}{2}$ is	A) $\frac{2}{3}$	B) $\frac{4}{5}$	C) $\frac{2}{7}$	D) $\frac{3}{7}$
4	The multiplicative inverse of $1\frac{1}{4}$ is	A) $\frac{2}{3}$	B) $\frac{4}{5}$	C) $\frac{2}{7}$	D) $\frac{3}{7}$
5	The multiplicative inverse of $3\frac{1}{2}$ is	A) $\frac{2}{3}$	B) $\frac{4}{5}$	C) $\frac{2}{7}$	D) $\frac{3}{7}$
6	The multiplicative inverse of $2\frac{1}{3}$ is	A) $\frac{2}{3}$	B) $\frac{4}{5}$	C) $\frac{2}{7}$	D) $\frac{3}{7}$
7	If : $\frac{x}{y} = \frac{2}{3}$, then $= \frac{3x}{2y}$	A) 0	B) 1	C) -1	D) -2
8	The rational number $\frac{a+2}{5}$ has a multiplicative inverse if $a \neq$	A) 2	B) 1	C) -1	D) -2
9	The rational number $\frac{a-1}{5}$ has a multiplicative inverse if $a \neq$	A) 2	B) 1	C) -1	D) -2
10	The rational number $\frac{a+1}{5}$ has a multiplicative inverse if $a \neq$	A) 2	B) 1	C) -1	D) -2
11	The rational number $\frac{a+2}{5}$ has a multiplicative inverse if $a \neq$	A) 2	B) 1	C) -1	D) -2
12	$\frac{3}{7} \times \dots = \frac{3}{7}$	A) 1	B) $3/7$	C) $7/3$	D) 0
13	$\frac{5}{7} \times \dots = \frac{3}{7}$	A) 1	B) $5/7$	C) $7/5$	D) 0
14	$\frac{3}{5} \times \dots = \frac{3}{7}$	A) 1	B) $3/5$	C) $75/3$	D) 0

Quiz	D	Date : .....	.....	الاسم
Mark	.....	13	.....	توقيع ولي الأمر

1	$\frac{5}{8} \times \dots = \frac{3}{7}$ A) 1 B) $\frac{5}{8}$ C) $\frac{8}{5}$ D) 0	
2	The property used in the operation $\frac{3}{5} \times 1 = \frac{3}{5}$ is A) Commutative B) identity C) closure D) associative	
3	If: $\frac{3}{4} \times n = 1$, then $n = \dots$ A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$	
4	If: $\frac{3}{5} \times n = 1$, then $n = \dots$ A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$	
5	If: $\frac{7}{2} \times n = 1$, then $n = \dots$ A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$	
6	If: $\frac{2}{7} \times n = 1$, then $n = \dots$ A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$	
7	If: $-\frac{3}{4} \times n = 1$, then $n = \dots$ A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{7}$ D) $-\frac{7}{2}$	
8	If: $-\frac{3}{5} \times n = 1$, then $n = \dots$ A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{7}$ D) $-\frac{7}{2}$	
9	If: $-\frac{7}{2} \times n = 1$, then $n = \dots$ A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{7}$ D) $-\frac{7}{2}$	
10	If: $-\frac{2}{7} \times n = 1$, then $n = \dots$ A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{7}$ D) $-\frac{7}{2}$	
11	$1\frac{1}{2} \times \dots = 1$ A) $\frac{2}{3}$ B) $\frac{2}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$	
12	$2\frac{1}{3} \times \dots = 1$ A) $\frac{2}{3}$ B) $\frac{3}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$	
13	$|-5| + 2 \times 3 - |2| = \dots$ A) 10 B) 9 C) 8 D) 7	

Homework

Quiz	A	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر
1	If $5a = 35$, $ab = 1$, then $b =$ A) $1/5$ B) $1/7$ C) $1/9$ D) $1/3$			
2	If $5a = 49$, $ab = 1$, then $b =$ A) $1/5$ B) $1/7$ C) $1/9$ D) $1/3$			
3	If $9a = 27$, $ab = 1$, then $b =$ A) $1/5$ B) $1/7$ C) $1/9$ D) $1/3$			
4	If $\frac{5}{7} \times n = \frac{5}{7}$, $-\frac{7}{3} \times m = 0$, then $m + n =$ A) 0 B) 1 C) $5/7$ D) $-7/3$			
5	If $X = -2\frac{1}{5}$, $y = 5\frac{1}{2}$, then $X \div y =$ A) $-2/5$ B) $-5/2$ C) $-11/5$ D) $11/2$			
6	If $X = 4$, $y = 6$ and $Z = 24$, then A) $Z = X/y$ B) $Z = X - y$ C) $Z = Xy$ D) $Z = X + y$			
7	If $a = 0$, $b = 5$, $c = 2$, then the numerical value of : $a^2b + ac =$ A) 0 B) 2 C) 7 D) 10			
8	If $a = 0$, $b = 5$, $c = 2$, then the numerical value of : $ab + ac =$ A) 0 B) 2 C) 7 D) 10			
9	If $a = 0$, $b = 5$, $c = 2$, then the numerical value of : $abc + ab =$ A) 0 B) 2 C) 7 D) 10			
10	The additive identity element in \mathbb{Q} is A) 0 B) 1 C) -1 D) 2			
11	The additive neutral element in \mathbb{Q} is A) 0 B) 1 C) -1 D) 2			
12	The additive inverse of zero is A) 0 B) -5 C) 2 D) 5			
13	The additive inverse of : -2 is A) -2 B) -5 C) 2 D) 5			
14	The additive inverse of : $(-\frac{3}{4})$ is A) $\frac{3}{4}$ B) $-\frac{3}{4}$ C) $\frac{4}{5}$ D) $-\frac{4}{5}$			
15	The additive inverse of : $(\frac{3}{4})$ is A) $\frac{3}{4}$ B) $-\frac{3}{4}$ C) $\frac{4}{5}$ D) $-\frac{4}{5}$			
16	The additive inverse of : $(-\frac{2}{7})^{\text{zero}}$ is A) 0 B) 1 C) -1 D) 2			

Quiz	B	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	The additive inverse of : $(\frac{1}{3})^2$ is	A) $-\frac{1}{4}$	B) $-\frac{1}{9}$	C) $-\frac{4}{9}$	D) $-\frac{4}{25}$
2	The additive inverse of : $-\frac{9}{7}$ is	A) $-9/7$	B) $9/7$	C) $-7/9$	D) $7/9$
3	The additive inverse of : $-\frac{7}{9}$ is	A) $-9/7$	B) $9/7$	C) $-7/9$	D) $7/9$
4	The value of $|1| + |-6| =$ .....	A) 5	B) 6	C) 7	D) 8
5	The value of $|1| + |-7| =$ .....	A) 5	B) 6	C) 7	D) 8
6	The value of $|-8| - |-6| =$ .....	A) 2	B) 3	C) 4	D) 5
7	The remainder of $\frac{1}{3}$ from $\frac{3}{9}$ is	A) 2	B) 0	C) 1	D) -1
8	The remainder of $\frac{2}{3}$ from $\frac{6}{9}$ is	A) 2	B) 0	C) 1	D) -1
9	The remainder of $\frac{1}{2}$ from $\frac{7}{14}$ is	A) 2	B) 0	C) 1	D) -1
10	$\frac{6X}{7} - \frac{X}{7} =$	A) $5/7$	B) $5X/7$	C) $3X/7$	D) $4X/7$
11	$-|-7/2|$ ..... The additive of $7/2$ A) < B) > C) =				
12	$|-7/2|$ ..... The additive of $7/2$ A) < B) > C) =				
13	If $A - \frac{3}{5} = 0$, then $A =$	A) $3/5$	B) $-3/5$	C) $-5/3$	D) $5/3$
14	If $A + \frac{5}{3} = 0$, then $A =$	A) $3/5$	B) $-3/5$	C) $-5/3$	D) $5/3$
15	The number 0.9 = (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
16	$0.\dot{6} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$

Quiz	C	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	$0.\dot{1}\dot{5} = \dots\dots\dots$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
2	$0.\dot{1}\dot{8} = \dots\dots\dots$ A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
3	If : $\frac{2}{5} = \frac{X}{15}$ then X = A) 25 B) 6 C) 15 D) 45	
4	If : $\frac{X}{36} = \frac{5}{12}$ then X = A) 25 B) 4 C) 15 D) 45	
5	If : $\frac{X}{72} = \frac{5}{8}$ then X = A) 25 B) 4 C) 15 D) 45	
6	If $\frac{X}{Y} = 1$, then $6X - 6Y = \dots\dots\dots$ A) 5 B) 6 C) 0 D) 9	
7	If $\frac{X}{Y} = 1$, then $7X - 7Y = \dots\dots\dots$ A) 5 B) 6 C) 7 D) 0	
8	The rational number $\frac{X-1}{X-9} = 0$, then X = A) 1 B) 2 C) 3 D) 4	
9	The rational number $\frac{X-2}{X-9} = 0$, then X = A) 1 B) 2 C) 3 D) 4	
10	If $\frac{X+1}{X+9} = 0$, then the value of X is A) -1 B) -2 C) -3 D) -4	
11	If $\frac{X-2}{X-3}$ is a rational number , then $X \neq \dots\dots\dots$ A) 1 B) 2 C) 3 D) 4	
12	If $\frac{X-2}{X-4}$ is a rational number , then $X \neq \dots\dots\dots$ A) 1 B) 2 C) 3 D) 4	
13	If $\frac{X-2}{X-5}$ is a rational number , then $X \neq \dots\dots\dots$ A) 5 B) 6 C) 7 D) 8	
14	If $\frac{X+1}{X-5} \in \mathbb{Q}$, then $X \neq \dots\dots\dots$ A) 3 B) 4 C) 5 D) 7	
15	The number $\frac{X+7}{X-7} \in \mathbb{Q}$, if $X \neq \dots\dots\dots$ A) 3 B) 4 C) 5 D) 7	
16	The number $\frac{X+7}{X-5} \in \mathbb{Q}$, if $X \neq \dots\dots\dots$ A) 3 B) 4 C) 5 D) 7	

Quiz	D	Date : .....	.....	الاسم
Mark	.....	21	.....	توقيع ولي الأمر

1	$3\frac{1}{4} \times \dots = 1$ A) $\frac{2}{3}$ B) $\frac{2}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$
2	$4\frac{1}{5} \times \dots = 1$ A) $\frac{2}{3}$ B) $\frac{2}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$
3	If : $\frac{a}{b} = 60$, then $\frac{a}{2b} = \dots$ A) 30 B) 120 C) 20 D) 180
4	If : $\frac{a}{b} = 60$, then $\frac{a}{3b} = \dots$ A) 30 B) 120 C) 20 D) 180
5	If : $\frac{a}{b} = \frac{1}{2}$, then $\frac{2a}{b} = \dots$ A) 1 B) $\frac{1}{6}$ C) 20 D) 4
6	If : $\frac{a}{b} = \frac{1}{2}$, then $\frac{a}{3b} = \dots$ A) 1 B) $\frac{1}{6}$ C) 20 D) 4
7	If : $\frac{a}{b} = \frac{2}{3}$, then $\frac{3a}{2b} = \dots$ A) 1 B) $\frac{1}{6}$ C) 20 D) 4
8	$\frac{2}{5} X = 10$, then $\frac{1}{5} X = \dots$ A) 5 B) 15 C) 20 D) 30
9	$\frac{2}{5} X = 10$, then $\frac{3}{5} X = \dots$ A) 5 B) 15 C) 20 D) 30
10	$\frac{2}{5} X = 10$, then $\frac{4}{5} X = \dots$ A) 5 B) 15 C) 20 D) 30
11	$\frac{2}{5} X = 20$, then $\frac{3}{5} X = \dots$ A) 5 B) 15 C) 20 D) 30
12	$3X = 42$, then $\frac{1}{7} X = \dots$ A) 2 B) 4 C) 6 D) 8
13	$3X = 42$, then $\frac{2}{7} X = \dots$ A) 2 B) 4 C) 6 D) 8
14	$3X = 42$, then $\frac{3}{7} X = \dots$ A) 2 B) 4 C) 6 D) 8
15	$3X = 42$, then $\frac{5}{7} X = \dots$ A) 2 B) 4 C) 6 D) 10
16	The necessary condition to make $\frac{X-2}{X+2}$ a rational number is $X \neq \dots$

	A) - 1	B) - 2	C) 3	D) 4
17	The necessary condition to make $\frac{X+3}{X-3}$ a rational number is $X \neq$			
	A) - 1	B) - 2	C) 3	D) 4
18	The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$			
	A) - 1	B) - 2	C) 3	D) 4
19	The quotient of dividing $2.25 \div 1.5 =$			
	A) 1.5	B) 0.15	C) 15	D) 150
20	The quotient of dividing $22.5 \div 1.5 =$			
	A) 1.5	B) 0.15	C) 15	D) 150
21	If $7a = 35$, $ab = 1$, then $b =$			
	A) $1/5$	B) $1/7$	C) $1/9$	D) $1/3$

[C] : Essay Problems :

1	Find the result of the following using the highest common factor : $(18)^2 - 9 \times 18 + 18$ (Calculated is not allowed)	2017 Exam (6) Question (3) (a)
2	By using the highest common factor , find the result of : $(17)^2 - 8 \times 17 + 17$	2017 Exam (14) Question (3) (b)
3	Find in the simplest form the value of : $\left(-\frac{18}{5} - \frac{9}{35}\right) \times \left(-\frac{3}{7}\right)$	2018 Exam (4) Question (4) (c)
4	Use the distribution property to find : $\frac{18}{5} \times \frac{25}{9} + \left(-\frac{3}{7}\right) \times \frac{25}{9}$	2018 Exam (14) Question (3) (a)
5	Use the distribution property to find : $\frac{2}{7} \times \frac{1}{3} + \frac{2}{7} \times \frac{3}{4} - \frac{2}{7}$	2018 Exam (8) Question (3) (a)
6	Use the distribution property to find : $\frac{3}{7} \times 2 + \frac{3}{7} \times 9 - \frac{3}{7} \times 4$	2018 Exam (2) Question (3) (a)
7	If $a = \frac{1}{2}$, $b = -\frac{1}{3}$, $c = \frac{3}{4}$, Find the value of : $(a + b) \div c$	2018 Exam (1) Question (4) (c)
8	If $X = -\frac{1}{3}$, $y = \frac{3}{4}$, $Z = -3$, Find the value of : $XY - YZ$	2018 Exam (9) Question (3) (a)

Exercises

Quiz A	Date : .....	.....	الاسم
Mark	.....	14	توقيع ولي الأمر
1	Which of the following is the value of X which : $X < 1 < \frac{1}{X}$		
	A) 1	B) -1	C) $\frac{1}{3}$ D) $-\frac{1}{3}$
2	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{5}{8}$		
	A) $\frac{5}{12}$	B) $\frac{9}{16}$	C) zero D) $\frac{5}{8}$
3	The number that lies halfway between $-1\frac{1}{2}$ and 1.5		
	A) $\frac{3}{8}$	B) $\frac{1}{2}$	C) $\frac{5}{4}$ D) zero
4	The rational number in half way between $\frac{1}{5}$ and $\frac{4}{5}$		
	A) $\frac{5}{14}$	B) $\frac{7}{10}$	C) $\frac{1}{2}$ D) $\frac{3}{11}$
5	Number lying one Fifth between $\frac{1}{4}$ and $\frac{2}{5}$ from smaller		
	A) $\frac{3}{8}$	B) $\frac{7}{25}$	C) $\frac{8}{25}$ D) $\frac{9}{25}$
6	$\frac{1}{9}$ of 27 is		
	A) 9	B) 3	C) 8 D) 4
7	The multiplicative inverse of $(-\frac{2}{3})^2$ is		
	A) $\frac{4}{9}$	B) $\frac{9}{4}$	C) -1 D) 1
8	$4\frac{1}{5} \times \dots = 1$		
	A) $\frac{2}{3}$	B) $\frac{2}{7}$	C) $\frac{4}{13}$ D) $\frac{5}{21}$
9	If $7a = 35$, $ab = 1$, then $b =$		
	A) $\frac{1}{5}$	B) $\frac{1}{7}$	C) $\frac{1}{9}$ D) $\frac{1}{3}$
10	The additive inverse of : $|-2|$ is		
	A) -2	B) -5	C) 2 D) 5
11	$-|-7/2|$ ..... The additive of $7/2$		
	A) <	B) >	C) =
12	$0.\dot{3} =$		
	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$ D) $\frac{2}{11}$
13	If $\frac{X}{Y} = 1$, then $2X - 2Y =$		
	A) 1	B) 2	C) 0 D) 4
14	The rational number $\frac{X-4}{X-9} = 0$, then $X =$		
	A) 1	B) 2	C) 3 D) 4

Quiz B	Date : .....	.....	الاسم
Mark	.....	16	توقيع ولي الأمر

1	The necessary condition to make $\frac{7}{x-3}$ a rational number is $x \neq$	
	A) -3 B) -5 C) 3 D) 5	
2	The smallest fraction of the following is	
	A) $\frac{1}{2}$ B) $\frac{3}{40}$ C) $\frac{5}{8}$ D) $\frac{7}{16}$	
3	If $\Delta + \square = 20$, $\Delta + \Delta + \square = 25$, then $\Delta =$	
	A) 5 B) 10 C) 15 D) 20	
4	The rational number lying at the half way between $\frac{1}{2}$ and $-\frac{1}{2}$	
	A) $\frac{5}{12}$ B) $\frac{9}{16}$ C) zero D) $\frac{5}{8}$	
5	The rational number half way between $\frac{1}{3}$ and $\frac{5}{9}$	
	A) $\frac{4}{9}$ B) $\frac{1}{2}$ C) $\frac{13}{30}$ D) $\frac{3}{5}$	
6	The rational number in half way between $\frac{1}{7}$ and $\frac{6}{7}$	
	A) $\frac{5}{14}$ B) $\frac{7}{10}$ C) $\frac{1}{2}$ D) $\frac{3}{11}$	
7	Number lying one Fifth between $\frac{1}{4}$ and $\frac{3}{5}$ from smaller	
	A) $\frac{3}{8}$ B) $\frac{7}{25}$ C) $\frac{8}{25}$ D) $\frac{9}{25}$	
8	The number which has no multiplicative inverse	
	A) 0 B) 1 C) -1 D) 2	
9	The multiplicative inverse of $(\frac{1}{2})^0$ is	
	A) 0 B) 1 C) -1 D) 2	
10	If : $\frac{a}{b} = 60$, then $\frac{a}{2b} =$	
	A) 30 B) 120 C) 20 D) 180	
11	If $5a = 35$, $ab = 1$, then $b =$	
	A) $\frac{1}{5}$ B) $\frac{1}{7}$ C) $\frac{1}{9}$ D) $\frac{1}{3}$	
12	The additive inverse of : $|-5|$ is	
	A) -2 B) -5 C) 2 D) 5	
13	$|-7/2|$ ..... The additive of $7/2$	
	A) < B) > C) =	
14	$0.\overline{6} =$	
	A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
15	If $\frac{x}{y} = 1$, then $3x - 3y =$	
	A) 1 B) 2 C) 3 D) 0	
16	The number $\frac{1}{x}$ is a rational, then $x \neq$	
	A) 1 B) 2 C) 3 D) zero	

Quiz	C	Date : .....	.....	الاسم
Mark	.....	16	.....	توقيع ولي الأمر

1	The necessary condition to make $\frac{7}{x-5}$ a rational number is $x \neq$	
	A) -3 B) -5 C) 3 D) 5	
2	The smallest fraction of the following is	
	A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{16}$ D) $\frac{7}{16}$	
3	If $\Delta + \square = 20$, $\Delta + \Delta + \square = 30$, then $\Delta =$	
	A) 5 B) 10 C) 15 D) 20	
4	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{6}{8}$	
	A) $\frac{5}{12}$ B) $\frac{9}{16}$ C) zero D) $\frac{5}{8}$	
5	The rational number half way between $\frac{1}{4}$ and $\frac{3}{4}$	
	A) $\frac{4}{9}$ B) $\frac{1}{2}$ C) $\frac{13}{30}$ D) $\frac{3}{5}$	
6	Number lying one third between 5 and 8 from smaller	
	A) 6 B) 7 C) 8 D) 9	
7	Number lying one Fifth between $\frac{1}{4}$ and $\frac{4}{5}$ from smaller	
	A) $\frac{3}{8}$ B) $\frac{7}{25}$ C) $\frac{8}{25}$ D) $\frac{9}{25}$	
8	The rational number which has no multiplicative inverse	
	A) 0 B) 1 C) -1 D) 2	
9	The multiplicative inverse of 0.5 is	
	A) 0 B) 1 C) -1 D) 2	
10	If : $\frac{a}{b} = 60$, then $\frac{a}{3b} =$	
	A) 30 B) 120 C) 20 D) 180	
11	If $a = 0$, $b = 5$, $c = 2$, then the numerical value of : $ab + ac =$	
	A) 0 B) 2 C) 7 D) 10	
12	The additive inverse of : $(\frac{1}{2})^2$ is	
	A) 0 B) 1 C) -1 D) 2	
13	$-|7/2|$ ..... The additive of $7/2$	
	A) < B) > C) =	
14	$0.\dot{1}\dot{5} =$	
	A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$	
15	If $\frac{x}{y} = 1$, then $4x - 4y =$	
	A) 0 B) 2 C) 3 D) 4	
16	If $\frac{x-3}{x-2}$ is a rational number , then $x \neq$	
	A) 1 B) 2 C) 3 D) 4	

Quiz	D	Date : .....	.....	الاسم
Mark	.....	15	.....	توقيع ولي الأمر

1	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{1}{3}$	A) $\frac{5}{12}$	B) $\frac{9}{16}$	C) zero	D) $\frac{5}{8}$
2	The number that lies halfway between $\frac{3}{5}$ and $\frac{2}{5}$	A) $\frac{3}{8}$	B) $\frac{1}{2}$	C) $\frac{5}{4}$	D) zero
3	The rational number in half way between $\frac{3}{5}$ and $\frac{4}{5}$	A) $\frac{5}{14}$	B) $\frac{7}{10}$	C) $\frac{1}{2}$	D) $\frac{3}{11}$
4	Number lying one Fifth between $\frac{1}{4}$ and $\frac{7}{8}$ from smaller	A) $\frac{3}{8}$	B) $\frac{7}{25}$	C) $\frac{8}{25}$	D) $\frac{9}{25}$
5	$\frac{1}{3}$ of 27 is	A) 9	B) 3	C) 8	D) 4
6	The multiplicative inverse of -1 is	A) 0	B) 1	C) -1	D) 2
7	$3\frac{1}{4} \times \dots = 1$	A) $\frac{2}{3}$	B) $\frac{2}{7}$	C) $\frac{4}{13}$	D) $\frac{5}{21}$
8	$3X = 42$, then $\frac{5}{7}X = \dots$	A) 2	B) 4	C) 6	D) 10
9	The additive inverse of zero is	A) 0	B) -5	C) 2	D) 5
10	$\frac{1}{2} + \frac{1}{3} = \dots$	A) $\frac{5}{6}$	B) $\frac{1}{15}$	C) $\frac{5}{4}$	D) $\frac{-2}{21}$
11	The number $0.5 = \dots$ (in the rational form)	A) $\frac{3}{10}$	B) $\frac{5}{10}$	C) $\frac{7}{10}$	D) $\frac{9}{10}$
12	If : $\frac{X}{24} = \frac{5}{12}$ then $X = \dots$	A) -20	B) 4	C) 10	D) 15
13	The rational number $\frac{X-3}{X-9} = 0$, then $X = \dots$	A) 1	B) 2	C) 3	D) 4
14	If $\frac{5}{X-4} \in \mathbb{Q}$, then $X \neq \dots$	A) 3	B) 4	C) 5	D) 7
15	The smallest fraction of the following is	A) $\frac{1}{12}$	B) $\frac{3}{4}$	C) $\frac{5}{8}$	D) $\frac{7}{16}$

Quiz	E	Date : .....	.....	الاسم
Mark	.....	15	.....	توقيع ولي الأمر

1	The necessary condition to make $\frac{7}{x+3}$ a rational number is $x \neq$	A) -3	B) -5	C) 3	D) 5
2	The smallest fraction of the following is	A) $\frac{1}{2}$	B) $\frac{3}{4}$	C) $\frac{5}{8}$	D) $\frac{7}{16}$
3	If $a + \frac{2}{a} = 3\frac{2}{3}$, then $a =$	A) 3	B) 5	C) 7	D) 9
4	The number that lies halfway between $\frac{1}{4}$ and $\frac{1}{2}$	A) $\frac{3}{8}$	B) $\frac{1}{2}$	C) $\frac{5}{4}$	D) zero
5	The rational number half way between $\frac{1}{5}$ and $\frac{2}{3}$	A) $\frac{4}{9}$	B) $\frac{1}{2}$	C) $\frac{13}{30}$	D) $\frac{3}{5}$
6	Number lying one third between 5 and 11 from smaller	A) 6	B) 7	C) 8	D) 9
7	The quotient of dividing $2.25 \div 1.5 =$	A) 1.5	B) 0.15	C) 15	D) 150
8	The multiplicative identity element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
9	If: $\frac{3}{4} \times n = 1$, then $n =$	A) $\frac{4}{3}$	B) $\frac{5}{3}$	C) $\frac{2}{7}$	D) $\frac{7}{2}$
10	If: $\frac{a}{b} = \frac{1}{2}$, then $\frac{2a}{b} =$	A) 1	B) $\frac{1}{6}$	C) 20	D) 4
11	If $a = 0$, $b = 5$, $c = 2$, then the numerical value of: $abc + a b =$	A) 0	B) 2	C) 7	D) 10
12	The value of $|-8| - |-3| =$ .....	A) 2	B) 3	C) 4	D) 5
13	If $A + \frac{5}{3} = 0$, then $A =$	A) $\frac{3}{5}$	B) $-\frac{3}{5}$	C) $-\frac{5}{3}$	D) $\frac{5}{3}$
14	$0.\dot{1}\dot{8} =$	A) $\frac{1}{3}$	B) $\frac{2}{3}$	C) $\frac{5}{33}$	D) $\frac{2}{11}$
15	If $\frac{x}{y} = 1$, then $9x - 9y =$	A) 5	B) 6	C) 0	D) 9

Homework

Quiz	A	Date : .....	.....	الاسم
Mark	.....	13	.....	توقيع ولي الأمر

1	If : $\frac{15}{X} = \frac{-3}{4}$ then X =	A) - 20	B) 4	C) 10	D) 15
2	The rational number $\frac{X-1}{X-9} = 0$, then X =	A) 1	B) 2	C) 3	D) 4
3	If $\frac{7}{3-X} \in \mathbb{Q}$, then X \neq	A) 3	B) 4	C) 5	D) 7
4	If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then X =	A) 2	B) 3	C) 7	D) 5
5	Which of the following is lies between : $\frac{7}{20}$, $\frac{7}{25}$?	A) $\frac{7}{10}$	B) $|- \frac{7}{11}|$	C) $\frac{7}{15}$	D) $\frac{7}{22}$
6	The number that lies halfway between $\frac{2}{3}$ and $1 \frac{5}{6}$	A) $\frac{3}{8}$	B) $\frac{1}{2}$	C) $\frac{5}{4}$	D) zero
7	The rational number in half way between $\frac{2}{7}$ and $\frac{3}{7}$	A) $\frac{5}{14}$	B) $\frac{7}{10}$	C) $\frac{1}{2}$	D) $\frac{3}{11}$
8	Number lying one third between 5 and 17 from smaller	A) 6	B) 7	C) 8	D) 9
9	$|-5| + 2 \times 3 - |1| =$ .....	A) 10	B) 9	C) 8	D) 7
10	The multiplicative inverse of 1 is	A) 0	B) 1	C) - 1	D) 2
11	$2\frac{1}{3} \times$ = 1	A) $\frac{2}{3}$	B) $\frac{3}{7}$	C) $\frac{4}{13}$	D) $\frac{5}{21}$
12	$\frac{2}{5} X = 10$, then $\frac{3}{5} X =$	A) 5	B) 15	C) 20	D) 30
13	The additive neutral element in \mathbb{Q} is	A) 0	B) 1	C) - 1	D) 2

Quiz B	Date : .....	.....	الاسم
Mark	.....	15	توقيع ولي الأمر

1	If $\frac{X-2}{X-9}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 9
2	If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then $X =$	A) 2	B) 3	C) 4	D) 5
3	Which of the following is lies between : $\frac{7}{11}$, $\frac{7}{20}$?	A) $\frac{7}{10}$	B) $|- \frac{7}{11}|$	C) $\frac{7}{15}$	D) $\frac{7}{22}$
4	If $a + \frac{2}{a} = 5\frac{2}{5}$, then $a =$	A) 3	B) 5	C) 7	D) 9
5	The number that lies halfway between $\frac{1}{6}$ and $\frac{5}{6}$	A) $\frac{3}{8}$	B) $\frac{1}{2}$	C) $\frac{5}{4}$	D) zero
6	The rational number half way between $\frac{2}{5}$ and $\frac{4}{5}$	A) $\frac{4}{9}$	B) $\frac{1}{2}$	C) $\frac{13}{30}$	D) $\frac{3}{5}$
7	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{5}{8}$	A) $\frac{5}{12}$	B) $\frac{9}{16}$	C) zero	D) $\frac{5}{8}$
8	Number lying one third between 5 and 14 from smaller	A) 6	B) 7	C) 8	D) 9
9	Zero $\div (15) =$	A) 1.5	B) 0.15	C) 15	D) zero
10	The multiplicative neutral element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
11	If : $\frac{3}{5} \times n = 1$, then $n =$	A) $\frac{4}{3}$	B) $\frac{5}{3}$	C) $\frac{2}{7}$	D) $\frac{7}{2}$
12	$\frac{2}{5} X = 10$, then $\frac{1}{5} X =$	A) 5	B) 15	C) 20	D) 30
13	The additive identity element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
14	The remainder of $\frac{1}{2}$ from $\frac{7}{14}$ is	A) 2	B) 0	C) 1	D) -1
15	If $A - \frac{5}{3} = 0$, then $A =$	A) $\frac{3}{5}$	B) $-\frac{3}{5}$	C) $-\frac{5}{3}$	D) $\frac{5}{3}$

Quiz	C	Date : .....	.....	الاسم
Mark	.....	15	.....	توقيع ولي الأمر

1	The number 0.3 = (in the rational form) A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$	
2	If : $\frac{2}{5} = \frac{X}{10}$ then X = A) - 20 B) 4 C) 10 D) 15	
3	The rational number $\frac{X-2}{X-9} = 0$, then X = A) 1 B) 2 C) 3 D) 4	
4	If $\frac{X+4}{X-3} \in \mathbb{Q}$, then X \neq A) 3 B) 4 C) 5 D) 7	
5	If : $X + \frac{2}{X} = 5 + \frac{2}{5}$, then X = A) 2 B) 3 C) 4 D) 5	
6	The remainder of $\frac{3}{4}$ from $\frac{21}{28}$ is A) 2 B) 0 C) 1 D) - 1	
7	Which of the following is the value of X which : $X < 1 < \frac{1}{X}$ A) 1 B) -1 C) 1/2 D) - 1/3	
8	The multiplicative inverse of 1 is A) 0 B) 1 C) - 1 D) 2	
9	If : $\frac{a}{b} = 60$, then $\frac{a}{3b} =$ A) 30 B) 120 C) 20 D) 180	
10	The additive inverse of zero is A) 0 B) - 5 C) 2 D) 5	
11	If $A + \frac{5}{3} = 0$, then A = A) $\frac{3}{5}$ B) $-\frac{3}{5}$ C) $-\frac{5}{3}$ D) $\frac{5}{3}$	
12	If $\frac{X}{Y} = 1$, then $2X - 2Y =$ A) 1 B) 2 C) 0 D) 4	
13	If $\frac{7}{3-X} \in \mathbb{Q}$, then X \neq A) 3 B) 4 C) 5 D) 7	
14	The smallest fraction of the following is A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{16}$ D) $\frac{7}{16}$	
15	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{5}{8}$ A) $\frac{5}{12}$ B) $\frac{9}{16}$ C) zero D) $\frac{5}{8}$	

Quiz	D	Date : .....	.....	الاسم
Mark	.....	27	.....	توقيع ولي الأمر

1	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{1}{3}$	A) $\frac{5}{12}$	B) $\frac{9}{16}$	C) zero	D) $\frac{5}{8}$
2	The rational number half way between $\frac{1}{5}$ and $\frac{2}{3}$	A) $\frac{4}{9}$	B) $\frac{1}{2}$	C) $\frac{13}{30}$	D) $\frac{3}{5}$
3	Number lying one Fifth between $\frac{1}{4}$ and $\frac{2}{5}$ from smaller	A) $\frac{3}{8}$	B) $\frac{7}{25}$	C) $\frac{8}{25}$	D) $\frac{9}{25}$
4	The multiplicative neutral element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
5	If : $\frac{a}{b} = 60$, then $\frac{a}{2b} =$	A) 30	B) 120	C) 20	D) 180
6	The additive neutral element in \mathbb{Q} is	A) 0	B) 1	C) -1	D) 2
7	$-|7/2|$ ..... The additive of $7/2$ A) < B) > C) =				
8	If $\frac{X-2}{X-9}$ is a rational number , then $X \neq$	A) 5	B) 6	C) 7	D) 9
9	The smallest fraction of the following is	A) $\frac{1}{2}$	B) $\frac{3}{40}$	C) $\frac{5}{8}$	D) $\frac{7}{16}$
10	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{1}{3}$	A) $\frac{5}{12}$	B) $\frac{9}{16}$	C) zero	D) $\frac{5}{8}$
11	The rational number half way between $\frac{1}{5}$ and $\frac{2}{3}$	A) $\frac{4}{9}$	B) $\frac{1}{2}$	C) $\frac{13}{30}$	D) $\frac{3}{5}$
12	Number lying one Fifth between $\frac{1}{4}$ and $\frac{2}{5}$ from smaller	A) $\frac{3}{8}$	B) $\frac{7}{25}$	C) $\frac{8}{25}$	D) $\frac{9}{25}$
13	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{5}{8}$	A) $\frac{5}{12}$	B) $\frac{9}{16}$	C) zero	D) $\frac{5}{8}$
14	The rational number half way between $\frac{2}{5}$ and $\frac{4}{5}$	A) $\frac{4}{9}$	B) $\frac{1}{2}$	C) $\frac{13}{30}$	D) $\frac{3}{5}$
15	Number lying one Fifth between $\frac{1}{4}$ and $\frac{3}{5}$ from smaller	A) $\frac{3}{8}$	B) $\frac{7}{25}$	C) $\frac{8}{25}$	D) $\frac{9}{25}$
16	The multiplicative inverse of -1 is	A) 0	B) 1	C) -1	D) 2
17	If : $\frac{a}{b} = \frac{1}{2}$, then $\frac{2a}{b} =$				

	A) 1	B) $\frac{1}{6}$	C) 20	D) 4
18	The additive inverse of : $|-2|$ is			
	A) -2	B) -5	C) 2	D) 5
19	If $A - \frac{5}{3} = 0$, then $A =$			
	A) $\frac{3}{5}$	B) $-\frac{3}{5}$	C) $-\frac{5}{3}$	D) $\frac{5}{3}$
20	If $\frac{X}{Y} = 1$, then $3X - 3Y =$			
	A) 1	B) 2	C) 3	D) 0
21	The rational number lying at the half way between $\frac{1}{2}$ and $-\frac{1}{2}$			
	A) $\frac{5}{12}$	B) $\frac{9}{16}$	C) zero	D) $\frac{5}{8}$
22	The rational number in half way between $\frac{2}{7}$ and $\frac{3}{7}$			
	A) $\frac{5}{14}$	B) $\frac{7}{10}$	C) $\frac{1}{2}$	D) $\frac{3}{11}$
23	Number lying one Fifth between $\frac{1}{4}$ and $\frac{4}{5}$ from smaller			
	A) $\frac{3}{8}$	B) $\frac{7}{25}$	C) $\frac{8}{25}$	D) $\frac{9}{25}$
24	The rational number lying at the half way between $\frac{1}{2}$ and $\frac{6}{8}$			
	A) $\frac{5}{12}$	B) $\frac{9}{16}$	C) zero	D) $\frac{5}{8}$
25	The rational number in half way between $\frac{3}{5}$ and $\frac{4}{5}$			
	A) $\frac{5}{14}$	B) $\frac{7}{10}$	C) $\frac{1}{2}$	D) $\frac{3}{11}$
26	The quotient of dividing $2.25 \div 1.5 =$			
	A) 1.5	B) 0.15	C) 15	D) 150
27	The multiplicative inverse of $(-\frac{2}{3})^2$ is			
	A) $\frac{4}{9}$	B) $\frac{9}{4}$	C) -1	D) 1

[C] : Essay Problems : -

- Find the rational number that lies halfway between : $\frac{1}{2}$ and $\frac{4}{5}$
- Find the rational number that lies halfway between : $\frac{1}{2}$ and $\frac{1}{5}$
- Find the rational number that lies one third of the way between : $\frac{1}{4}$ and $\frac{7}{8}$ from the side of the smaller
- Find the rational number that lies one fourth of the way between : $-\frac{1}{4}$ and $-\frac{7}{8}$ from the side of the smaller
- Find the rational number that lies one fifth of the way between : $\frac{1}{4}$ and $\frac{7}{8}$ from the side of the smaller
- Find the rational number that is $\frac{2}{5}$ the way from $-1\frac{2}{5}$ to $1\frac{3}{5}$ in the simplest form.

Alg.

Exercise (1)

[1] Complete :

- 1) Rational number is
- 2) The set of integer is
- 3) If $\frac{a}{b}$ is rational then $b \neq$
- 4) The number $\frac{4}{x-3}$ is rational if $x \neq$
- 5) The number $\frac{x+5}{x-5}$ is rational if $x \neq$
- 6) The rational number $\frac{5-x}{x-4} = 0$ if $x =$
- 7) The rational number $\frac{a}{b}$ is an integer if
- 8) Express of 0.57 as rational number is simplest form
- 9) The rational number $\frac{x}{-4}$ is negative if x zero .
- 10) If $\frac{a}{b}$ is rational number and $ab = \text{zero}$ then $a =$
- 11) Write the rational number $\frac{7}{11}$ as decimals

Exercise (2)

[1] Represent each of the following on number line :

a) $\frac{-7}{4}$

b) $1\frac{1}{5}$

c) $-\frac{1}{2}$

[2] Write the correct sign (< , > , =) :

a) Every positive rational numberzero .

b) Every negative rational numberzero .

c) $\left| \frac{-13}{2} \right|$ $6\frac{1}{2}$

d) $\frac{-9}{3}$ -3

e) $\left| \frac{15}{2} \right|$ $7\frac{1}{2}$

f) 0.5 0.5°

g) $\left| \frac{-3}{2} \right|$ $\frac{1}{2}$

[3] Write two rational number lying between :

1) $\frac{1}{3}$ and $\frac{4}{5}$

2) $\frac{-1}{2}$ and 1

3) 0.3 and $\frac{4}{5}$

[4] Complete :

1) Between each two successive integers there is

2) The opposite rational number $\frac{1}{3}$ on number line

3) The number of integers lying between $\frac{5}{7}$ and $\frac{8}{11}$ are

[5] Write the rational number that equal $\frac{3}{4}$ and the sum of terms 28 .

Exercise (3)

[1] Complete :

- 1) The additive identity element in φ is
- 2) The additive inverse of number $\frac{3}{5}$ is
- 3) The additive inverse of $(\frac{2}{3})^{\text{zero}}$ is
- 4) The additive inverse of $|\frac{-4}{5}|$ is
- 5) The additive inverse of number zero
- 6) The additive inverse of -0.5 is
- 7) The remainder of subtracting $\frac{1}{5}$ from $\frac{6}{5} =$
- 8) The remainder of subtracting $\frac{1}{3}$ from $\frac{-4}{3}$
- 9) The remainder of subtracting $\frac{-3}{2}$ from zero
- 10) $A + \frac{7}{8} = \text{zero}$ then $A =$
- 11) If $(A + \frac{1}{4})$ is additive inverse of number $\frac{3}{4}$ then $A =$
- 12) If $X = 2$, $Y = 3$ and $Z = 4$ then $\frac{X}{Y} - \frac{Z}{X} =$

[2] Using the number line to find result :

a) $-\frac{1}{3} + \frac{7}{3} =$

b) $\frac{5}{7} + \frac{1}{7} =$

[3] Using the addition properties in :

a) $\frac{5}{8} + \left(-\frac{3}{4}\right) + \frac{3}{8} + \frac{3}{4}$

b) $7\frac{1}{4} + \left(-11\frac{1}{4}\right)$

c) $\frac{2}{3} + \frac{4}{5} + \frac{3}{4}$

[4] If $X = \frac{5}{6}$, $Y = \frac{-1}{3}$, $Z = \frac{1}{2}$ find :

a) $X + Z$

b) $X - Y$

c) $(X + Z)$

d) $(X + Y) - Z$

Exercise (4)

[1] Complete :

- 1) The multiplicative identity of the rational no. is
- 2) The multiplicative inverse of no. $\frac{3}{7}$ is
- 3) The multiplicative inverse $(\frac{-3}{5})^{\text{zero}}$ is
- 4) The rational no. $\frac{a-1}{5}$ has multiplicative inverse if $a = \dots\dots\dots$
- 5) The rational no. has multiplicative inverse is
- 6) $\frac{2}{3} \times (\frac{-4}{5}) = \frac{-4}{5} \times \dots\dots\dots$
- 7) If $\frac{a}{b} = 80$ then $\frac{a}{2b} = \dots\dots\dots$
- 8) $\frac{X}{Y} = \frac{2}{3}$ then $\frac{3X}{2Y} = \dots\dots\dots$
- 9) $\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \dots\dots\dots \times \frac{50}{51} = \dots\dots\dots$
- 10) $\frac{-7}{3} \times (\frac{-3}{7}) = n$, then $n = \dots\dots\dots$
- 11) $\frac{-5}{3} \times \dots\dots\dots = 0$
- 12) $\dots\dots\dots \times \frac{19}{3} = 1$

[2] Using properties of following :

- 1) $\frac{6}{37} \times 7 + \frac{6}{37} \times 5 + \frac{6}{37} \times (-11)$

$$2) \frac{-3}{7} \times 8 + 5 \times \left(\frac{-3}{7}\right) + \left(\frac{-3}{7}\right) \times 9$$

$$3) \frac{27}{11} \times \frac{1}{4} - \frac{27}{11} \times \frac{1}{4} + \frac{27}{11} \times 9$$

[3] If $X = \frac{3}{2}$, $Y = \frac{-1}{4}$ and $Z = -2$

a) $\frac{1}{XYZ}$

b) $\frac{X}{Y} - \frac{Z}{Y}$

[4] Find the middle rational no. lying between :

a) $\frac{3}{8}$, $\frac{5}{8}$

b) $\frac{-1}{2}$, $\frac{-3}{4}$

c) zero , $\frac{2}{5}$

[5] Find the rational number lying at :

a) One fourth of way between $\frac{5}{7}$, $\frac{-3}{7}$

b) One tenth of way between $\frac{-1}{2}$, $\frac{-3}{5}$

Unit Two

[1] Complete :

- 1) The degree of term $3 X^2 Y$ isits coefficient is
- 2) The coefficient of algebraic term $\frac{2}{3} X^4 Y Z^3$ isand its degree
- 3) The degree of an absolute term in algebraic expression
- 4) $-3a^5b$ number of termsname is , degree is
- 5) $5 X^3 - 7 X + 4$ number of termsname, degree is
- 6) The coefficient of the algebraic term X isand its degree is
- 7) If the degree of the algebraic term $5 X^n Y^2$ is 5 then $n =$
- 8) If the degree of algebraic term Y^{m+1} is the degree of a algebraic term $5 X^2 Y^4$ then
in =

Sheet (7)

[1] Find the result of each of following :

- 1) $3X + 2X$
- 2) $-5a^2 + 3a^2$
- 3) $\frac{3X}{7} - \frac{X}{7}$
- 4) $-2 X^2 Y + 3Y X^2$
- 5) Subtract Y^2 from $-3 Y^2$
- 6) What is increase of $3a^2 b$ than $a^2 b$ is ?
- 7) What is decrease of $-3ab$ than $2ab$?

8) Find the sum of :

a) $3a - 4b + 6c$
 $5a + 6b - 2c$

b) $3a - 7b - 5c + 2$
 $-a + 4b + c - 5$

c) $5x + 2y - z + 2$
 $7x + y - 3z + 3$
 $-2x - 5y + 4z - 1$

[2] Find the sum of following :

1) $3X - 2Y$, $X + 2Y - 2$

2) $2a^2b - 3ab^2 + b^3$, $-a^2b + b^3$

3) $3X - 4X^2 + X^3$, $2X^2 - 6X^2 - 6X + 5$, $7X + 4 - X^3$

[3] Reduce each of the following :

1) $5X - 3X^2 + 4 - 7X^2 - 6X - 1$

2) $6X^2Y - 4XY^2 + 2XY^2 - 5X^2Y + 2X^2Y^2$

3) $5X^2 - 2X + 8 - 7X - 3 + X^2$

4) $-a^2 - 5ab + 4b^2 - 2 - 3a^2 + 2ab - 2b^2 - 7$

Sheet (8)

[1] Simplify :

1) $4(X - 3) = \dots\dots\dots$

2) $a(a - 2) = \dots\dots\dots$

3) $-3k(2k^2 - 3k - 7) = \dots\dots\dots$

4) $-2c(7 - 3c) = \dots\dots\dots$

5) $2X^2Y(2X^2 - 3XY + Y^2) = \dots\dots\dots$

6) $Lm^2(L^2 - 3mL - 4m^2) = \dots\dots\dots$

7) $(3X + 4)(2X + 5) = \dots\dots\dots$

8) $(5X + 1)(3X + 2) = \dots\dots\dots$

9) $(2X + 5Y)(2X - 5Y) = \dots\dots\dots$

10) $(X - 4)(X + 4) = \dots\dots\dots$

11) $(2X + Y)^2 = \dots\dots\dots$

12) $(4X + 5Y)^2 = \dots\dots\dots$

13) $3(m - 5)(m + 2) = \dots\dots\dots$

14) $4(XY - 2)^2 = \dots\dots\dots$

15) $(2X^2 + 3)(X^2 - 5) - (3X^2 + 2)^2 = \dots\dots\dots$

[2] Find value of K :

- 1) $(2X + Y)^2 = 4X^2 + KXY + Y^2$ then $K = \dots\dots\dots$
- 2) If $(X - Y)(2X + Y) = 2X^2 + KXY - Y^2$ then $K \dots\dots\dots$
- 3) $(X - 3)(X + 3) = X^2 + K$ then $K = \dots\dots\dots$

[3] Find numerical value of following :

If $X = 1$, $Y = -2$

- 1) $(2Y + 7)(3Y + 4)$
- 2) $(X + 4)(3X + 2)$
- 3) $(3X + Y)(X + 3Y)$

Sheet (8)

[1] Find the quotient :

a)
$$\frac{18a^2}{3a}$$

b)
$$\frac{18m^3 + 36m^2}{-2m^2}$$

c)
$$\frac{48X^3 - 80mX^2}{8X^2}$$

d)
$$\frac{32X^5 - 32X^2 + 36X^7}{4X^2}$$

e) $2X^2 + 13X + 15$ by $X + 5$

f) $X^3 - 27$ by $X - 3$

g) $3X^3 - 4X + 1$ by $X - 1$

h) If area of rectangle is $(2X^2 + 7X - 15)$ and length is $(X + 5)$ find perimeter if $X = 3$ cm.

Sheet (9)

Factorize by identifying the H.C.F :

- a) $3 X^2 + 6 X$
- b) $35 a + 10 a^2$
- c) $3 X^2 + 12 X - 6$
- d) $8 Y^2 - 4 X^2$
- e) $3X (a + b) + 7 (a + b)$
- f) $3 X^3 (X - 4) + 4 X (X - 4) + 3 (X - 4)$
- g) $4 m^5 (2X + 5 Y) - 3 m (2 X + 5 Y) - 6 (2 X + 5 Y)$
- h) $7 \times 123 + 7 \times 35 - 7 \times 18$
- i) $6 \times 15^2 + 18 \times 15 - 24 \times 15$

Sheet (10)

- 1) The mode of set of values is
- 2) The mode of values of 2 , 3 , 8 , 2 , 9 is
- 3) The mode of values 3 , 6 , 13 , 19 , 19 , 12 is
- 4) If the mode of values $\frac{1}{3}, \frac{1}{7}, \frac{1}{5}, \frac{1}{7}$ is $\frac{1}{X}$ then $X =$
- 5) If the mode of values 12 , 17 , $X - 1$, 7 , 12 is 7 then $X =$
- 6) If mode of values of $a + 2$, $a + 1$, $a + 3$, $a + 2$ equal 12 then $a =$
- 7) The median of values 4 , 8 , 3 is
- 8) The median of values 6 , 5 , 9 , 8 is
- 9) The median of values 8 , 17 , 4 , 6 , 10 is
- 10) The median of values 6 , 2 , 5 , 4 is
- 11) The mean of values 5 , 12 , 6 , 17 is
- 12) The mean of values 2 , 5 , 8 , 9 , 14 , 28 is
- 13) The mean of values $2 - a$, 4 , 1 , 5 , $3 + a$ is
- 14) The mean of values X , $X - Y$, $Y - X$ is

[2] The following table shows the number of hours that . Ali and Ahmed study daily in a week .

Ali	7	5	8	9	8	6	4
Ahmed	8	9	7	9	9	5	5

- find mean of studying hour for each Ali , Ahmed
- Find median of each of them .
- Find mode of hours of each of them .

11 The Set of Rational Numbers

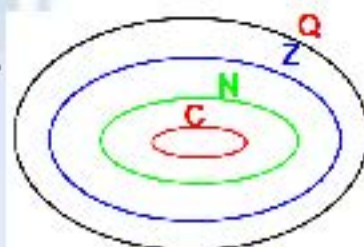


- 1) The set of Counting numbers $C = \{ 1, 2, 3, \dots \}$
- 2) The set of Natural numbers $N = \{ 0, 1, 2, 3, \dots \}$
- 3) The set of integers $Z = \{ \dots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \dots \}$

$$Z = \dots \cup \dots \cup \dots$$

- 4) The set of rational number $Q = \{ x: x = \frac{a}{b}, a \in Z, b \in Z, b \neq 0 \}$

$$Q = \dots \cup \dots \cup \dots$$



*Each integer is a rational number with denominator = 1

* The rational number $\frac{a}{b}$ is an integer if a is divisible by b

* The rational number $\frac{a}{b}$ is an integer if b is divisible by a

*The rational number $\frac{a}{b}$ is an integer if $b=1$

*If $\frac{a}{b}$ is a rational number, then $b \neq 0$

*If the rational number $\frac{a}{b} = 0$, then $a=0$

[1] Put the suitable sign: \in , \notin , \subset or $\not\subset$:

a) $\frac{5}{3}$

Q

e) $\frac{4}{3-2}$

Q

b) $\frac{-2}{7}$

Q

h) $\frac{-10}{2}$

Q

c) $\frac{3}{\text{zero}}$

Q

g) 2%

Q

d) **0**

Q

h) **2**

Q

[2]] Write the following numbers on the form of the rational number : $\frac{a}{b}$

- a) 0.15 b) 40% c) $|-9\frac{1}{3}|$ d) $0.\dot{3}$ e) $0.\dot{1}\dot{8}$

.....

[3] Write the following numbers on the percentage form:

- a) 0.30 b) $\frac{2}{5}$ c) $|-2\frac{1}{4}|$

.....

[4] Write each of the following rational numbers in the form of a terminating decimal:

1) $\frac{2}{5} = \dots\dots\dots$

2) $-2\frac{7}{25} = \dots\dots\dots$

[5] Using a calculator , Write each of the following rational numbers in the form of a recurring decimal:

1) $\frac{2}{3} = \dots\dots\dots$

2) $5\frac{71}{333} = \dots\dots\dots$

[6] Why does the definition of the rational number $\frac{a}{b}$ state that $b \neq 0$?

.....

[7] Complete each of the following :

- 1) Zero is neither nor
- 2) Each integer is ,it's denominator =
- 3) If $\frac{a}{b}$ is a rational , then $b \neq \dots\dots\dots$
- 4) If $\frac{5}{a}$ is a rational number , then $a \neq \dots\dots\dots$
- 5) The number $\frac{4}{X-3}$ is a rational number if $X \neq \dots\dots\dots$
- 6) The number $\frac{X+5}{X-5}$ is a rational number if $X \neq \dots\dots\dots$
- 7) The number $\frac{2}{5X}$ is a rational number if $X \neq \dots\dots\dots$
- 8) The rational number $\frac{5-X}{X-4} = 0$ if $X = \dots\dots\dots$
- 9) The rational number $\frac{X-4}{X} = 0$ if $X = \dots\dots\dots$
- 10) $-\frac{4}{5} = \frac{20}{X}$, then $X = \dots\dots\dots$



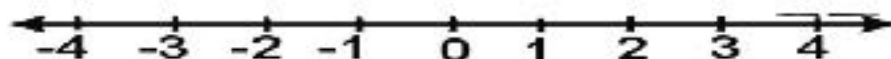
[8] Choose the correct answer :

- 1) The number $\frac{a-6}{a-7}$ is not a rational number if $a = \dots\dots$
- a) 7 b) -7 c) 4 d) zero
- 2) The rational number $\frac{a}{b}$ is an integer if
- a) $a < b$ b) $a > b$ c) a is divisible by b d) b is divisible by a
- 3) Express of $0.\dot{5}7$ as a rational number in simplest form
- a) $\frac{57}{100}$ b) $\frac{75}{99}$ c) $\frac{575}{1000}$ d) $\frac{19}{33}$
- 4) The rational number $\left| -\frac{8}{25} \right| = \dots\dots\dots$
- a) $\frac{-8}{25}$ b) $-0.3\dot{2}$ c) $0.\dot{3}2$ d) 32 %
- 5) The number 12 % =
- a) 0.3 b) 1.2 c) $\frac{3}{25}$ d) 0.012
- 6) The rational number $\frac{X}{-4}$ is negative if $X \dots\dots\dots$
- a) > zero b) < zero c) \geq zero d) = zero
- 7) The rational number $\frac{X}{-4}$ is positive if $X \dots\dots\dots$
- a) > zero b) < zero c) \geq zero d) = zero
- 8) If $\frac{a}{b}$ is a rational number and $a \neq 0, b \neq 0$, then
- a) $a = 0, b \neq 0$ b) $0 \neq a, b \neq 0$ c) $a = 0, b = 0$ d) $a \neq 0, b = 0$
- 9) If $\frac{15}{x} = \frac{-3}{4}$, then $x = \dots\dots\dots$
- a) -20 b) -5 c) 5 d) 20
- 10) The number $\frac{5}{3} > \dots\dots\dots$
- a) $\frac{10}{3}$ b) $\frac{25}{9}$ c) $\frac{10}{6}$ d) $\frac{3}{5}$

[2] Comparing and ordering rational numbers.

[1] Represent each of the following numbers on the number line :

a) 4, 0 and - 4



b) $\frac{2}{5}$, 0 , $-\frac{4}{5}$



c) $\frac{1}{7}$, $-\frac{2}{3}$



d) $3\frac{1}{2}$, $-1\frac{1}{5}$



[2] Write the correct sign (< , = or >) :

1) $\frac{-1}{2}$ zero 2) $-4\frac{1}{2}$ - 5

3) $\left|\frac{15}{2}\right|$ $7\frac{1}{2}$ 4) $\left|\frac{-13}{2}\right|$ $6\frac{1}{2}$

5) $\frac{-9}{3}$ - 3 6) $\frac{-4}{5}$ $\frac{-6}{5}$

7) 1.6 $\left|\frac{-8}{5}\right|$ 8) 0.5 $0.\dot{5}$

9) Every negative rational number Zero

10) Every positive rational number Zero

The density of the rational numbers

Between every two different rational numbers there are infinite of rational numbers.

[1] Write two rational numbers lying between:

1) $\frac{1}{5}$ and $\frac{4}{5}$

.....
.....

2) $\frac{1}{3}$ and $\frac{2}{3}$

.....
.....

2) $-\frac{1}{2}$ and 1

.....
.....

3) $\frac{1}{3}$ and $\frac{2}{7}$

.....
.....

[2] Identify and write four rational numbers between $\frac{3}{2}$ and $\frac{3}{4}$, such that one of the is **an integer** and the other is a rational number.

.....
.....

Try by yourself



[1] write four rational numbers between $\frac{1}{2}$ and $\frac{1}{3}$

.....

[2] Complete with a suitable rational number.

[a] $\frac{2}{5} < \square < \frac{3}{5}$

[c] $\frac{1}{8} < \square < \frac{1}{4}$

[b] $-\frac{2}{3} < \square < -\frac{1}{3}$

[d] $-\frac{2}{7} < \square < -\frac{3}{14}$

[3] Write the rational number that equals $\frac{3}{5}$ and the sum of its terms is 24

.....

.....

[4] Write the rational number that equals $\frac{2}{7}$ and the sum of its terms is 45

.....

.....

[5] Find the rational number half way between $\frac{3}{5}$ and $\frac{4}{5}$.

.....

.....

[6] Find the rational number which is lying at third way of the distance between $\frac{3}{5}$ and $\frac{4}{5}$ from the smaller.

.....

.....

[7] Find the rational number which is lying at third way of the distance between $\frac{3}{5}$ and $\frac{4}{5}$ from the greater.

.....

.....

[8] Find the rational number half way between $\frac{3}{5}$ and $-\frac{4}{5}$

.....

.....

[9] Choose the correct answer :-

- 1) The opposite rational number to $\frac{1}{3}$ on the number line is
- a) $-\frac{1}{3}$ b) $\frac{2}{3}$ c) 1 d) $\frac{3}{3}$
- 2) The rational number which between $\frac{3}{4}$ and $\frac{4}{5}$ is
- a) $\frac{30}{40}$ b) $\frac{15}{20}$ c) $\frac{1}{40}$ d) $\frac{16}{20}$
- 3) The number of integers lying between $\frac{7}{4}$ and $\frac{11}{8}$ is
- a) zero b) 1 c) 2 d) an infinite number.
- 4) The necessary condition to make $\frac{7}{x+5}$ a rational number is $x \neq$
- a) -5 b) 5 c) 75 d) 7
- 5) $|- \frac{2}{3}|$ zero.
- a) > b) < c) = d) \leq



[3] Adding and subtracting rational numbers

(1) Find the sum of each of the following:

a) $\frac{2}{5} + \frac{1}{5} = \dots\dots\dots$



b) $\frac{-3}{8} + \frac{2}{8} = \dots\dots\dots$



c) $\frac{-3}{4} + \frac{3}{4} = \dots\dots\dots$



d) $\frac{2}{3} + \frac{4}{5} = \dots\dots\dots$

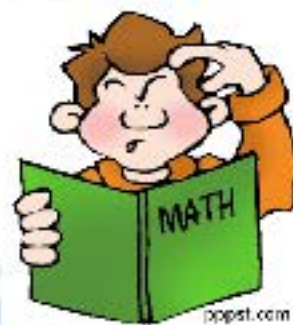


e) $\frac{3}{5} + \left(\frac{-7}{10}\right) = \dots\dots\dots$



*Properties of addition:

- 1) $a + b \in \mathbb{Q}$ closure property
- 2) $a + b = b + a$ commutative property
- 3) $(a + b) + c = a + (b + c)$ associative property
$$\left(\frac{2}{5} + \frac{1}{3}\right) + \frac{1}{2} = \frac{2}{5} + \left(\frac{1}{3} + \frac{1}{2}\right)$$
- 4) The additive identity in \mathbb{Q} is Zero
 $0 + 3 = 3$
- 5) The additive inverse property
 $3 + (-3) = 0$
 $-\frac{1}{3} + \frac{1}{3} = 0$



(1) Write the property of addition operation which used in each of the following:

- [a] $\frac{7}{2} + \frac{9}{16} = \frac{9}{16} + \frac{7}{2}$ EVS
- [b] $\left[\frac{2}{3} + \left(-\frac{1}{3}\right)\right] + \left(-\frac{1}{6}\right) = \frac{2}{3} + \left[-\frac{1}{3} + \left(-\frac{1}{6}\right)\right]$
- [c] $\frac{3}{4} + \left(-\frac{3}{4}\right) = 0$
- [d] $\frac{5}{8} + 0 = \left(\frac{5}{8}\right)$

(2) Complete :-

- 1) The additive identity element in \mathbb{Q} is
- 2) The additive inverse of the number $\frac{3}{5}$ is
- 3) The additive inverse of the number $-\frac{4}{7}$ is
- 4) The additive inverse of the number $\left(\frac{2}{3}\right)^{\text{zero}}$ is
- 5) The additive inverse of the number $|\frac{-4}{5}|$ is
- 6) The additive inverse of the number zero is
- 7) The additive inverse of the number -0.5 is

(3) Find the sum in simplest form by using the properties of addition operation in Q:

a) $\frac{3}{5} + \frac{1}{5} + \left(-\frac{3}{5}\right) = \dots\dots\dots$

b) $\frac{2}{7} + \frac{5}{8} + \frac{3}{7} = \dots\dots\dots$

(4) Find the result of each of the following:

a) $\frac{5}{7} - \frac{2}{7} = \dots\dots\dots$

b) $\frac{3}{8} - \frac{7}{8} = \dots\dots\dots$

c) $\left(-\frac{2}{7}\right) - \frac{3}{7} = \dots\dots\dots$

d) $\frac{1}{6} - \frac{2}{3} = \dots\dots\dots$

e) $3 - \frac{2}{5} = \dots\dots\dots$

f) $\left(\frac{2}{5}\right) - \left(-\frac{1}{4}\right) = \dots\dots\dots$

$\frac{a}{b} - \frac{c}{d} = \frac{a}{b} + \left(-\frac{c}{d}\right)$



Try by your self:

(1) Calculate the value of each of following in its simplest form :

a) $\frac{3}{7} - \left(\frac{-2}{5} \right)$

=

b) $\frac{4}{5} - \frac{3}{4}$

=

c) $\frac{1}{4} + 2\frac{3}{8}$

=

d) $2\frac{3}{8} - \frac{1}{4}$

=

(2) If $X = \frac{5}{6}$, $Y = \frac{-1}{3}$ and $Z = \frac{1}{2}$, Find in the simplest form :

a) $X - Y =$

b) $(X + Y) - Z =$

(3) If $a = \frac{1}{2}$, $b = \frac{-3}{2}$ find the value of:

$(a - b)^4 =$

(4) Complete :

1) The remainder of subtracting $\frac{1}{5}$ from $\frac{6}{5}$ equals

2) The remainder of subtracting $\frac{1}{3}$ from $\frac{-4}{3}$ is

3) The increase of $\frac{3}{7}$ than $\frac{2}{7}$ is

4) The decrease of $\frac{3}{7}$ than $\frac{2}{7}$ is

5) If $(A + \frac{1}{4})$ is additive inverse of the number $\frac{3}{4}$, then $A =$

6) If $X = 2$, $Y = 3$ and $Z = 4$ then $\frac{X}{Y} - \frac{Z}{X} =$

(5) Use the number line to find the result of the following :-

$$-\frac{1}{3} + \frac{5}{3} =$$

.....

$$\frac{3}{8} - \frac{7}{8} =$$

.....

(6) Use the addition properties to find:

a) $\frac{5}{8} + (\frac{-3}{4}) + \frac{3}{8} + \frac{3}{4}$

.....

.....

.....

b) $\frac{2}{7} + \frac{3}{4} + \frac{5}{7}$

.....

.....

.....

Multiplying and Dividing rational numbers

If $\frac{a}{b}, \frac{c}{d}$, are two rational numbers then $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$

Find :

- 1) $\frac{2}{5} \times \frac{3}{4} = \dots\dots\dots$
- 2) $\left(\frac{-2}{3}\right) \times \left(\frac{-2}{5}\right) = \dots\dots\dots$
- 3) $\left(\frac{-1}{5}\right) \times \frac{4}{7} = \dots\dots\dots$
- 4) $(-3) \times \frac{3}{4} = \dots\dots\dots$
- 5) $\left(\frac{-12}{3}\right) \times \frac{3}{4} = \dots\dots\dots$



***Properties of the multiplication operation :**

- 1) $a \times b \in \mathbb{Q}$ closure property
- 2) $a \times b = b \times a$ commutative property
- 3) $(a \times b) \times c = a \times (b \times c)$ associative property

$$\left(\frac{2}{5} \times \frac{1}{3}\right) \times \frac{1}{2} = \frac{2}{5} \times \left(\frac{1}{3} \times \frac{1}{2}\right)$$

- 4) The multiplicative identity in \mathbb{Q} is 1
 $1 \times 3 = 3$

- 5) The multiplicative inverse property

$$\frac{2}{3} \times \frac{3}{2} = 1$$

$$3 \times \frac{1}{3} = 1$$

$$-\frac{2}{7} \times -\frac{7}{2} = 1$$

[1] Complete :

- 1) The multiplicative Identity of the rational number is
- 2) The multiplicative inverse of the number $\frac{3}{7}$ is
- 3) The multiplicative inverse of $(\frac{-3}{5})^{\text{zero}}$ is
- 4) The multiplicative inverse 0.7 is
- 5) The rational number $\frac{a-1}{5}$ has a multiplicative inverse if $a \neq$
- 6) The rational number which has no multiplicative inverse is
- 7) $\frac{2}{3} \times (\frac{-4}{5}) = \frac{-4}{5} \times$
- 8) $\frac{4}{5} \times$ = $\frac{4}{5}$
- 9) $2\frac{3}{5} \times$ = 1
- 10) $\frac{-4}{5} \times$ = 0
- 11) If $\frac{a}{b} = 80$, then $\frac{a}{2b} =$
- 12) If $\frac{X}{Y} = \frac{2}{3}$, then $\frac{3X}{2Y} =$
- 13) If $\frac{X}{Y} = \frac{2}{3}$, then $3x =$
- 14)) If $\frac{X}{Y} = \frac{2}{3}$, then $3x - 2Y =$



[2] Use the properties of multiplication operation to find each of the following :

$$1) \frac{5}{12} \times \frac{2}{3} \times \left(\frac{-3}{5}\right)$$

=

=

$$2) \left(\frac{-5}{7}\right) \times \frac{2}{3} \times \left(\frac{-3}{5}\right)$$

=

=

$$3) \frac{5}{12} \times 3 + \frac{5}{12} \times 9$$

=

=

$$4) \frac{6}{37} \times 7 + \frac{6}{37} \times 5 + \frac{6}{37} \times (-11)$$

=

=

$$5) \frac{-3}{7} \times 8 + 5 \times \left(\frac{-3}{7}\right) + \left(\frac{-3}{7}\right)$$

=

=

$$6) \frac{5}{12} \times 3 + \frac{5}{12} \times 9 - \frac{5}{12}$$

=

=

[3] Find the value of (n) in each of following :

$$a) \frac{-7}{3} \times \left(\frac{-3}{7}\right) = n$$

$$b) \frac{-5}{3} \times n = 0$$

$$c) \frac{3}{7} \times n = \frac{3}{7} \times \left(\frac{-4}{5}\right)$$

$$d) n \times \frac{19}{3} = 1$$

$$e) \frac{5}{9} \times n = \frac{5}{9}$$

$$f) n \times \left[\frac{1}{2} + \left(\frac{-3}{5}\right)\right] = n \times \frac{1}{2} + 5 \times \left(\frac{-3}{5}\right)$$

[4] If $X = \frac{3}{2}$, $Y = \frac{-1}{4}$ and $Z = -2$, then find each of the following :

a) $\frac{1}{XYZ}$

=

b) $\frac{X}{Y} - \frac{Z}{Y}$

=

c) $(X + Z) \div (Y - Z)$

=



V.I.N

- ✓ Multiplying a rational number by 1 does not change its value.
- ✓ Multiplying a rational number by zero, the product equals zero.
- ✓ 1 is the multiplicative identity element in \mathbb{Q} .
- ✓ There does not exist a multiplicative inverse for the number zero as $\frac{1}{0}$ is meaningless.

Try by yourself

*Complete each of the following:

- [1] The multiplicative inverse of the number $-\frac{9}{8}$ is
- [2] If $\frac{a}{b} = \frac{2}{3}$, then $\frac{3a}{2b} = \dots\dots\dots$
- [3] The remainder of subtracting $(\frac{1}{5})$ from $(-\frac{2}{5})$ equals
- [4] The simplest form of the expression : $\frac{3}{4} \times (\frac{1}{2} - \frac{1}{3})$ is
- [5] The rational number half way between $-\frac{5}{2}$ and $-\frac{3}{2}$ is

*Choose the correct answer:

- [1] If $\frac{15}{x} = \frac{-3}{4}$, then $x = \dots\dots\dots$
- (a) -20 (b) -5 (c) 5 (d) 20
- [2] The number $= \frac{-9}{-7}$ is the additive inverse of the number :
- (a) $\frac{-9}{7}$ (b) $\frac{-7}{9}$ (c) $\frac{7}{9}$ (d) $\frac{9}{7}$
- [3] If $5x - 3y = 0$, then $x : y = \dots\dots\dots$
- (a) 5 : 3 (b) 3 : 5 (c) -5 : 3 (d) -3 : 5
- [4] If $a \times \frac{b}{3} = \frac{a}{3}$, then b equals :
- (a) -a (b) 1 (c) $\frac{a}{3}$ (d) a
- [5] The number $\frac{5}{3} > \dots\dots\dots$
- (a) $\frac{10}{3}$ (b) $\frac{25}{9}$ (c) $\frac{10}{6}$ (d) $\frac{3}{5}$

*Use the property of distribution to calculate the value of :

$$\frac{6}{37} \times 7 + \frac{6}{37} \times 5 + \frac{6}{37} \times (-11)$$

.....

.....

* Find a rational number at the middle of the way between :-

a) $\frac{3}{8}$, $\frac{5}{8}$

.....

.....

b) $-\frac{1}{2}$, $-\frac{3}{4}$

.....

.....

2- Find a rational number lying at :

a) One third of the way between $\frac{4}{7}$, $1\frac{3}{4}$

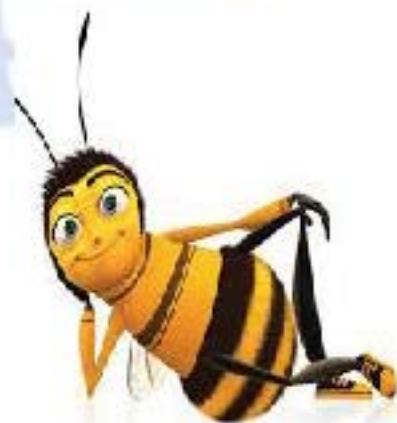
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b) One fifth of the way between $-\frac{2}{3}$, $-\frac{3}{5}$

.....

.....



Unit Two

[1] Algebraic Terms and Algebraic Expressions.

[1] Complete the following table:

Algebraic term	-7	$2ab^2$	3	$7ab^3c$	$-8x^2b$	xy^2
Coefficient	-7	2				
Degree	0	$1+2=3$				
	Zero degree	Third degree				

[2] Complete :

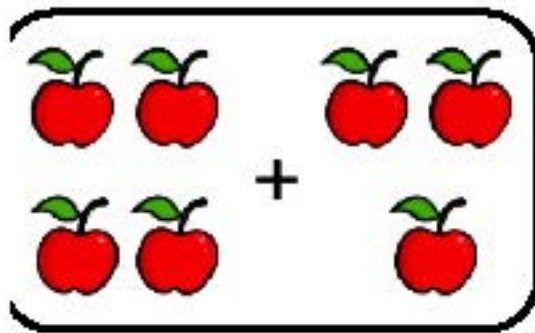
- 1) The degree of term $3X^2Y$ is and its coefficient is
- 2) The coefficient of the algebraic term $\frac{2}{3}X^4YZ^3$ is and its degree is
- 3) The degree of the absolute term in algebraic expression is
- 4) The coefficient of the algebraic term $(-2)^3$ is and its degree is
- 5) $5X^2 + 3$ is an algebraic expression of the degree
- 6) The number of terms of the algebraic expression : $5Y^2 - 3XY + 2X^2$ is and its degree is
- 7) The coefficient of the algebraic term X is and its degree is
- 8) If the degree of the algebraic term $5X^nY^2$ is 5 , then $n =$

[3] Arrange the terms of the algebraic expression : $7ab + 5a^5b^3 - 3a^2b^5$ according to the descending order of the indices of a

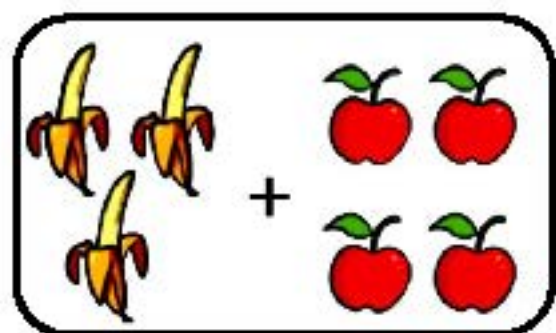
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[2] like Algebraic Terms.



$$4a + 3a = 7a$$



$$3b + 4a$$

The terms **3a** and **4a** are like terms.

The terms **3b** and **4a** are unlike terms.

The like terms

Terms whose variables and their exponents are the same.

Example: **7x** and **2x** are **like terms** because the variables are both "x"

But **7x** and **7x²** are NOT like terms (they are **Unlike Terms**)

1 | Put circles around the like terms in each of the following:

1) $3X, 3a^2, 2X$

2) $5X^2, 7, 5a, 2$

3) $-2XY, 3Y, 5X^2y, 3XY^2, X^2Y$



*** Simplify: $9a - 4b - 2c - 5a + 7b + 3c$**

Solution:

$$\begin{aligned}\text{The expression} &= (9a - 5a) + (-4b + 7b) + (-2c + 3c) \\ &= (9 - 5)a + (-4 + 7)b + (-2 + 3)c \\ &= 4a + 3b + c\end{aligned}$$

[2] Complete:

1) $3X + 2X = \dots\dots\dots$

2) $-5a^2 + 3a^2 = \dots\dots\dots$

3) The result of subtracting $3a$ from $7a$ is $\dots\dots\dots$

4) The result of subtracting $-3X^2$ from $5X^2$ is $\dots\dots\dots$



[3] Reduce to the simplest form:

1) $3a + 2b + 5a + 4b$

$= \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

3) $2X - 4y - 9X - 3y$

$= \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

2) $3x - 5y - x + 2y =$

$= \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

4) $19m - 4n + 11m - 17n + 9n =$

$= \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

[4] Simplify each of the following algebraic expressions:

(1) $5X - 3X^2 + 4 - 7X^2 - 6X - 1$

$= \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

(3) $a^2 + 4a - 5 + 3a^2 - 6a + 1$

$= \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

(2) $6X^2y - 3Xy^2 + 2Xy^2 - 5X^2y + 2X^2y^2$

$= \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

(4) $5X^2 - 2X + 8 - 7X - 3 + X^2$

$= \dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

[3] Adding and Subtracting Algebraic Expressions.

[1] Find the sum of each of following :-

a) $3a - 4b + 6c$

$$5a + 6b - 2c$$

.....

b) $3a - 7b - 5c + 2$

$$-a + 4b + c - 5$$

.....

c) $5x + 2y - z + 2$

$$7x + y - 3z + 3$$

$$-2x - 5y + 4z - 1$$

.....

$-2a^3 + 3a^2b - b^3$

d) $-5a^2b + 3ab^2 - 2b^3$

$$5a^3 - 4ab^2 + 3b^3$$

.....

[2] Find the sum of each of following :-

1) $3X - 2Y + 5$, $X + 2Y - 2$

.....

.....

2) $2a^2b - 3ab^2 + b^3$, $-a^2b + b^3$

.....

.....

.....



[3] Subtract:

1) $X - 2$ from $2X - 5$

.....
.....
.....

2) $2X + 6y - 7$ from $2X + 2 - 5y$

.....
.....
.....

3) $3X^2 - 5X$ from $1 - 5X + 6X^2$

.....
.....
.....

[4] What is the increase of :

1) $5a + 7b$ than $3a - 2b$

.....
.....

2) $X^2 - 5X - 1$ than $3X^2 + 2X - 3$

.....
.....

[5] What is the decrease of :

$2a + 3b$ than $5b - 3a$

.....
.....



Try by yourself

M1 Simplify:

[a] $3x - 5y - x + 2y$

[c] $2x - 4y - 9x - 3y$

.....

[b] $7a + 6b - 11a + 9b$

[d] $19m - 4n + 11m - 17n + 9n$

.....

[2] Add $2x - 5z + y$ and $7x + 4y - 2z$

.....

.....

[3] Subtract $-a^2 - 5ab + 4b^2$ from $3a^2 - 2ab - 2b^2$

.....

.....

[4] Find the sum of each of the following:

[a] $3x - 4y + 2$

[b] $3a - 7b - 5c + 2$

[c] $5x + 2y - z + 2$

$- 3x + 7y + 3$

$- a + 4b + c - 5$

$7x + y - 3z + 3$

$2a + 3c + 3$

$- 2x - 5y + 4z - 1$

[5] [a] What is the increase of $x^2 - 5x - 1$ than $3x^2 + 2x - 3$

.....

[b] What is the decrease of $2x - 8y - z$ than the sum of $3x - 3y + z$, $2x - 4y - 8z$

.....

.....

[4] Multiplying and Diving Algebraic Terms.

1- Carry out the following operations :

- 1) $5X \times 3Y = \dots\dots\dots$
- 2) $-8y^5 \times (-7y^4) = \dots\dots\dots$
- 3) $5X^3y^4 \times 2Xy^2 = \dots\dots\dots$
- 4) $5ab^2 \times (-2a^2b) = \dots\dots\dots$

2- Find the quotient of each of following :

- 1) $-32a^3b^6 \div (-4a^3b^2) = \dots\dots\dots$
- 2) $8m^4n^3 \div (-4mn^2) = \dots\dots\dots$
- 3) $-18X^3Y^6Z^3 \div (-6X^3Y^3Z^3) = \dots\dots\dots$
- 4) $9X^5Y^4 \div 6X^3Y = \dots\dots\dots$

3- Simplify :-

1) $\frac{2}{3} t^4 \times \frac{3}{2} t^4$

.....
.....

2) $\frac{15a^3b}{2} \times \frac{8ab^2}{10}$

3) $\frac{4h^3K^3}{7} \times \frac{21hk^3}{2}$

4) $(3X^3) \times (\frac{1}{6} X^2)$

.....

2- Complete :

- 1) $36a^5b^8 = 12a^3b^2 \times \dots\dots\dots$
- 2) $9a^5 = 3a \times \dots\dots\dots$
- 3) $-4c^3d^3 = 2cd^2 \times \dots\dots\dots$
- 4) $98a^7b^4 = \dots\dots\dots \times 14a^7b$



[5] Multiplying a Monomial by an Algebraic Expression.

1- Simplify:

1) $5X(2X + Y - 3Z) = \dots\dots\dots$

2) $\frac{1}{3}X^2(6X^2 - 9XY - 3Y^2) = \dots\dots\dots$

3) $1m^2(1^2 - 3ml - 4m^2) = \dots\dots\dots$

2- Complete :

1) $X(\dots\dots\dots - 2X) = 6X - \dots\dots\dots$

2) $3X(\dots\dots\dots + 5Y) = 6X^2 + \dots\dots\dots$

3) $2X(3X \dots\dots\dots) = \dots\dots\dots - 10X$

4) $3XY(\dots\dots\dots - \dots\dots\dots - 5X^2) = 6X^2Y - 12XY^2 \dots\dots\dots$

5) $9XY^2(\dots\dots\dots - \dots\dots\dots - 5X^2) = 36X^2Y^5 - 18XY^2 - \dots\dots\dots$

3- Put in the simplest form :

1) $3a(a - b) + 4a(2a + b)$

$= \dots\dots\dots$

$= \dots\dots\dots$

2) $3a(4a - 2) - 4a(3a - 2)$

$= \dots\dots\dots$

$= \dots\dots\dots$



4- Simplify : $3(1 - 2X) - (X^2 - 5X + 3) + 2X(X + 3)$

then find numerical value if $X = -2$

.....

.....

.....

[6] Multiplying a Binomial by an Algebraic Expression.

1- Write the missing term in each of the following products :

1) $(X + 5)(X + 3) = \dots\dots\dots + 8X + \dots\dots\dots$

2) $(X + 2)(X - 4) = \dots\dots\dots - \dots\dots\dots - 8$

3) $(a - 3)(a - 7) = a^2 - \dots\dots\dots + \dots\dots\dots$

2- Find the product of each of the following :

1) $(X + 3)(X - 5) = \dots\dots\dots$

2) $(2X - Y)(3X + 4Y) = \dots\dots\dots$



3- Simplify each each of the following to the simplest form:

1) $(a + 3)^2$

2) $(4m - 7)^2$

3) $(2X + 3Y)^2$

4) $(X - 3Y)^2$

4- Find by direct product the result :

1) $(a + 2)(a - 2)$

2) $(4m - 7)(4m + 7)$

3) $(6X - 2Y)(6X + 2Y)$

4) $(X + 2Y)(X - 2Y)(X^2 + 4Y^2)$

5- Choose the correct answer :

1) The middle term in the expansion of $(3X - 1)^2$ is

- a) $3X$ b) $-6X$ c) $6X$ d) $6X^2$

2) The middle term in the expansion of $(2a + 3b)^2$ is

- a) $12ab$ b) $-12ab$ c) $6ab$ d) $-6ab$

3) $X - Y = 3$ and $X + Y = 5$ then $X^2 - Y^2 =$

- a) 2 b) -2 c) 8 d) 15

4) If $X + Y = 7$ then the numerical value of the expression $X^2 + 2XY + Y^2 =$

- a) 7 b) 14 c) 49 d) 28

5) If $(X - 3)(X + 3) = X^2 + k$, then $K =$

- a) 9 b) 6 c) -9 d) -6

6- Complete the following :

1) $(2X - 1)^2 =$ $-4X + 1$

2) $(X - 5)(\text{.....}) = X^2 - 25$

3) $(X + 5)(X + \text{.....}) = X^2 + \text{.....} + 15$

7- Simplify :

1) $(X - 3)^2 - 9$

.....

.....

2) $3(m - 5)(m + 2)$

.....



[7] Dividing an Algebraic Expression by a monomial.

1- Find the quotient in each of following :

1) $5a - 10$ by 5

=
.....

2) $12a^2b + 20ab^2$ by $4ab$

=
.....

3) $3a^2b - 6ab^2 + 12ab$ by $-3ab$

=
.....

4) $32X^5 - 48X^3 + 72X^7$ by $-8X^3$

=
.....

5) $\frac{12X^2 - 9X}{3X}$

=
.....

6) $\frac{18X^4Y^2 - 42X^5Y^4 + 30X^6Y^5}{-6X^2Y^2}$

=
.....



Try by yourself



Find the quotient in each case:

[a] $\frac{18a^2}{3a}$

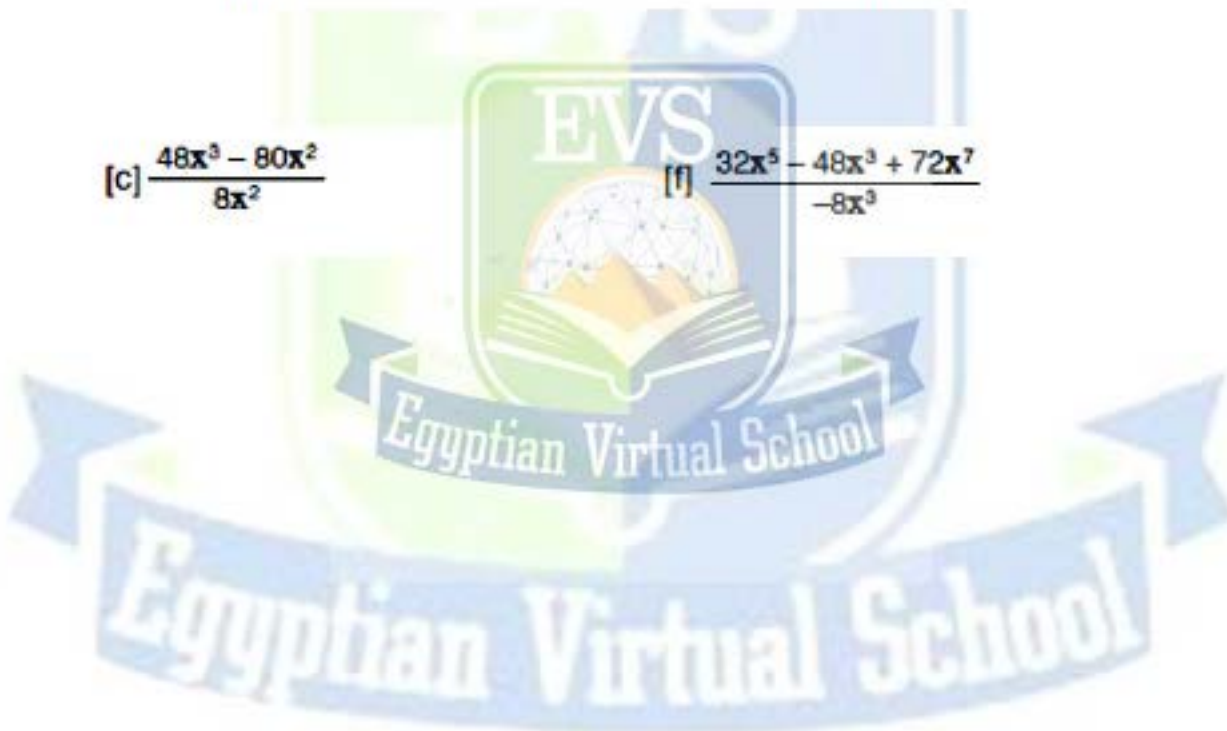
[d] $\frac{18x^4y^5 - 42x^5y^4}{-6x^2y^2}$

[b] $\frac{18m^4 + 32m^2}{-2m^2}$

[e] $\frac{24x^4 - 18x^3 - 42x^2}{6x^2}$

[c] $\frac{48x^3 - 80x^2}{8x^2}$

[f] $\frac{32x^5 - 48x^3 + 72x^7}{-8x^3}$



[8] Dividing an Algebraic Expression by another one.

1- Find the quotient of dividing of each of the following expressions.

1) $X^2 + 5X + 6$ by $(X + 2)$

.....

.....

.....

.....

2) $2X^2 + 13X + 15$ by $(X + 5)$

.....

.....

.....

.....

3) $3X^2 + X^3 - X - 3$ by $(X^2 - 1)$

.....

.....

.....

.....

4) $X^4 + 3X^2 + 2$ by $(X^2 + 1)$

.....

.....

.....

.....

[9] Factorization by identifying the H.C.F.

1- Factorize each of following by H.C. F. :

1) $5a + 5b$

.....

3) $35a + 10a^2$

.....

5) $49b^2 - 7b^3$

.....

2) $5Y - 10$

.....

4) $15a^3b - 5a^2b^2$

.....

6) $6a^3 - 4a^2b^2$

.....

7) $18a^2bc - 6ab^2c + 30abc^2 - 24a^2b^2c^2$

.....

2- Complete the following:

1) $6a^2 + 12ab = 3a(\dots + \dots)$

2) $a^2b + b^2a = \dots (a + b)$

3) $X(a + 1) - y(a + 1) = (a + 1)(\dots - \dots)$

3- Find the result by the H.C. F :

1) $7 \times 123 + 7 \times 35 - 7 \times 18$

.....

.....

2) $6 \times (15)^2 + 18 \times 15 - 8 \times 15$

.....

.....

3) $5 \times (48)^2 + 7 \times 48 + 53 \times 48$

.....



Unit Three statistics.

1- Complete :



- 1) The mode of a set of values is
- 2) The mode of the values 2 , 3 , 8 , 2 , 9 is
- 3) The mode of the values 3 , 6 , 10 , 13 , 19 , 19 , 21 is
- 4) If the mode of the values $\frac{1}{3}$, $\frac{1}{7}$, $\frac{1}{5}$, $\frac{1}{7}$ is $\frac{1}{X}$ then $X = \dots\dots\dots$
- 5) If the mode of the values 12 , 7 , $X + 1$, 7 , 12 is 7 then X is
- 6) If the mode of the values of $a + 2$, $a + 1$, $a + 3$, $a + 2$ equal 12 then $a = \dots\dots\dots$
- 8) The median of : 6 , 5 , 9 , 8 is
- 9) The median of : 8 , 17 , 4 , 6 , 10 is
- 10) The order of the median of 6 , 2 , 5 , 4 , 1 is
- 11) The mean of the values 5 , 12 , 6 , 17 is
- 12) The mean of the numbers 2 , 5 , 8 , 9 , 14 , 28 is
- 13) The mean of the value $2 - a$, 4 , 1 , 5 , $3 + a$ is
- 15) If mean of the numbers 9 , 4 , 5 , X is 5 then X is
- 16) If the mean of : $X - 1$, X , $X + 1$ is 6 then $X = \dots\dots\dots$

Set of Rational numbers

Remember:-

(1) Counting Numbers = $\{1, 2, 3, 4, \dots\}$

(2) Set of Integers $\mathbb{Z} = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$

(3) Set of Natural Number = $\{0, 1, 2, 3, \dots\}$

(4) $\mathbb{Z}^+ = \{1, 2, 3, \dots\}$

(5) $\mathbb{Z}^- = \{-1, -2, -3, \dots\}$

(6) $\mathbb{N} \subset \mathbb{Z}$

(7) $\mathbb{Z} = \mathbb{Z}^+ \cup \{0\} \cup \mathbb{Z}^-$

(8) If $|x| = a$ then $x = \pm a$

Ex: - Complete

(1) $\mathbb{Z} - \mathbb{N} = \dots$

(2) $\mathbb{Z}^+ \cup \{0\} = \dots$

(3) $\mathbb{Z}^+ \cap \mathbb{Z}^- = \dots$

(4) $\mathbb{N} \cap \mathbb{Z} = \dots$

(5) $|-3| = \dots$

(6) $|0| = \dots$

(7) If $|x| = 7$ then $x = \dots$ or $x = \dots$

(8) If $|x| = 0$ then $x = \dots$

Ex: 2, find the value of x when

(1) $x + 2 = 1 - 3$

(2) $|x| + 2 = 5$

(3) $|x| - 5 = 2 + 1 - 2$

(4) $2x + 5 = 7$

21

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Figure 1

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100

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100

$$\sqrt{5}$$
$$\sqrt{5}$$
$$\sqrt{5}$$

($\div 5$) Dividing the two terms by 5

$(\div 5)$

$$\sqrt{5}$$

$$\sqrt{5}$$

$$\sqrt{5}$$

$$\sqrt{5}$$
$$\sqrt{5}$$
$$\sqrt{5}$$

(To make denominator 10 multiplying the two terms by 2

$$\sqrt{5}$$

***mer**

$$\underline{\underline{2}} \cdot \frac{-3}{8}$$

To make denominator 1000 multiplying the two terms by 125)

$$\frac{-3}{8} = \frac{-3 \times 125}{8 \times 125} = -\frac{375}{1000} = -0.375$$

$$\frac{3}{4}$$

To make denominator 100 multiplying the two terms by 25

$$\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = 0.75$$

$$\boxed{4} \quad \frac{7}{25}$$

To make denominator 100 multiplying the two terms by 4

$$\frac{7}{25} = \frac{7 \times 4}{25 \times 4} = \frac{28}{100} = 0.28$$

$$\boxed{5} - 2 \frac{2}{25} = -2 \frac{2 \times 4}{25 \times 4} = -2 \frac{8}{100} = -2.08$$

$$\boxed{6} \quad \frac{7}{5} = \frac{7 \times 2}{5 \times 2} = \frac{14}{10} = 1.4$$

17) $| -2\frac{1}{5} | = 2\frac{1}{5} = 2\frac{1 \times 2}{5 \times 2} = 2\frac{2}{10} = 2.2$

$$\textcircled{8} - 5 \frac{3}{5} = -5 \frac{3 \times 2}{5 \times 2} = -5 \frac{6}{10} = -5.6$$

*Mr/Ahmed Omar**Mr/Ahmed Omar**Mr/Ahmed Omar**Mr/Ahmed Omar**Mr/Ahmed Omar*

Ex:- Write each of the following in the form $\frac{a}{b}$

$$\textcircled{1} 0.4 = \frac{4}{10} = \frac{2}{5}$$

$$② \quad 0 = \frac{0}{1}$$

$$[3] - 0.01 = -\frac{1}{100}$$

(4) $0.75 = \frac{75}{100} = \frac{3}{4}$

5 $3\frac{3}{4} = \frac{15}{4}$

$$\boxed{6} \quad 8 \frac{2}{3} = \frac{26}{3}$$

⑦ $0.001 = \frac{1}{1000}$

$$\textcircled{8} - 7 = -\frac{7}{1}$$

⑨ $1.25 = \frac{125}{100} = \frac{25}{20} = \frac{5}{4}$

(10) $30\% = \frac{30}{100} = \frac{3}{10}$

$$\boxed{11} \quad 45\% = \frac{45}{100} = \frac{9}{20}$$

12) $0.\dot{5} = \frac{5}{9}$

$$(13) 0.\dot{1}\dot{5} = \frac{15}{99} = \frac{5}{33}$$

$$\boxed{14) -1.18} = -1 \frac{18}{99} = -1 \frac{2}{11} = -\frac{13}{11}$$

5) $0.0\dot{4}\dot{5} = \frac{45}{990} = \frac{5}{110} = \frac{1}{22}$

$$\boxed{16} \quad 0.285 = \frac{285}{999} = \frac{95}{333}$$

Try by yourself

1) Write the required condition to make each of the following arational number:

1) $\frac{5}{a-3}$

2) $\frac{3}{4-x}$

3) $\frac{7}{8b}$

4) $\frac{2}{|x|-1}$

5) $\frac{5}{x}$

6) $\frac{6}{x-9}$

7) $\frac{2}{5x-10}$

8) $\frac{4}{2x+8}$

9) $\frac{1}{5-x}$

10) $\frac{2}{3a+3}$

11) $\frac{16}{4-|x|}$

12) $\frac{8x}{3|x|-9}$

2) Write the required condition to make each of the following = 0

1) $\frac{4-3}{a+1}$

2) $\frac{b+2}{b-2}$

3) $\frac{4-x}{x}$

4) $\frac{5+y}{y+7}$

5) $\frac{2y-4}{y-1}$

6) $\frac{6-3x}{x+4}$

7) $\frac{x}{x+5}$

8) $\frac{2x}{x-3}$

3) put each of the following numbers in the form of a terminating decimal:

1) $\frac{1}{2}$

2) $\frac{3}{5}$

3) $\frac{-7}{20}$

4) $2\frac{3}{25}$

5) $\frac{3}{2}$

6) $\frac{7}{2}$

7) $\frac{12}{5}$

8) $\frac{-6}{25}$

9) $\frac{-7}{50}$

10) $\frac{5}{8}$

11) $-2\frac{3}{5}$

4) Write each of the following numbers in the form of percentage:

1) $\frac{4}{5}$

2) $\frac{5}{8}$

3) $2\frac{1}{2}$

4) $\frac{8}{25}$

5) $\frac{1}{4}$

6) $1\frac{1}{3}$

7) $|-0.4|$

8) $\frac{6}{4}$

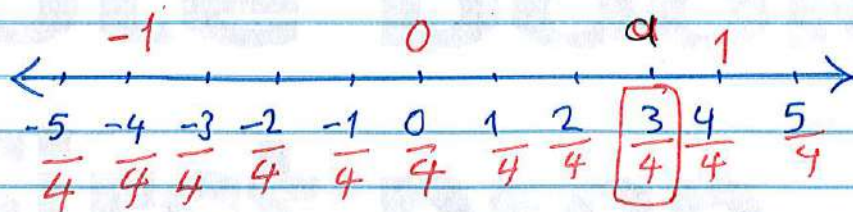
9) $|-1\frac{13}{2}|$

10) $0.\dot{3}$

Comparing and ordering Rational Numbers.

Ex:1 Represent the rational number $\frac{3}{4}$ on the number line

Solution:-



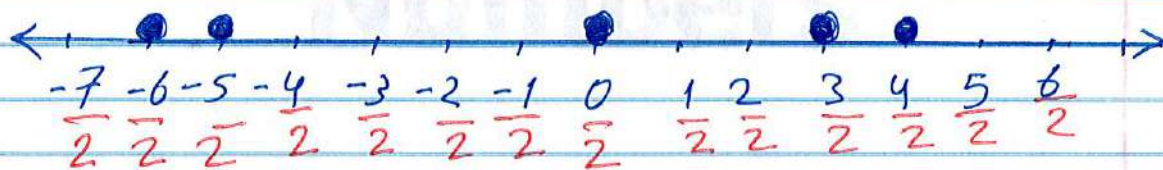
Ex:2 Represent the rational numbers $2, 0, \frac{3}{2}, -\frac{5}{2}, -3$ on the number line then arrange them descendingly

Solution:

We should convert their denominators to have common denominator at first

Since L.C.M of the denominators is 2
Then the numbers after converting their denominators are

$$\frac{4}{2}, \frac{0}{2}, \frac{3}{2}, -\frac{5}{2}, -\frac{6}{2}$$



then : $\frac{4}{2} > \frac{3}{2} > \frac{0}{2} > -\frac{5}{2} > -\frac{6}{2}$

i.e $2 > \frac{3}{2} > 0 > -\frac{5}{2} > -3$

Ex3 Compare between the two rational numbers

$$\frac{2}{3} \text{ and } \frac{3}{4}$$

Solution

We should convert their denominators to have common denominator at first

$$\frac{2}{3} \xrightarrow{\text{①} \times 4} \frac{8}{12} \quad \frac{3}{4} \xrightarrow{\text{②} \times 3} \frac{9}{12} \Rightarrow \frac{8}{12} \quad \frac{9}{12}$$

Since $\frac{8}{12} < \frac{9}{12}$ then $\frac{2}{3} < \frac{3}{4}$

Ex4: find four rational numbers lying between the two numbers $\frac{1}{2}$ and $\frac{1}{3}$

Solution

$$\text{Q1 } -\frac{3}{5} \text{ and } -\frac{2}{3}$$

$$\text{① } \frac{1}{2} \xrightarrow{\times 2} \frac{2}{4} \quad \frac{1}{3} \xrightarrow{\times 2} \frac{2}{6} \Rightarrow \frac{3}{6} \text{ and } \frac{2}{6}$$

$$\Rightarrow \frac{30}{60} \text{ and } \frac{20}{60}$$

$$\Rightarrow \frac{20}{60} < \frac{21}{60} < \frac{22}{60} < \frac{23}{60} < \frac{24}{60} < \frac{30}{60}$$

$$\text{② } -\frac{3}{5} \xrightarrow{\times 3} -\frac{9}{15} \quad -\frac{2}{3} \xrightarrow{\times 2} -\frac{10}{15} \Rightarrow -\frac{9}{15} \text{ and } -\frac{10}{15}$$

$$\Rightarrow -\frac{90}{150} \text{ and } -\frac{100}{150}$$

then the numbers are: $-\frac{91}{100}, -\frac{92}{100}, -\frac{93}{100}, -\frac{94}{100}$

(12)

Ex:5 Complete each of the following using the suitable Sign ($<$, $>$ or $=$):

① $\frac{7}{5} \dots \frac{4}{5}$

② $-\frac{3}{4} \dots -\frac{2}{4}$

③ $1\frac{1}{5} \dots \frac{1}{6}$

④ $\frac{3}{6} \dots \frac{2}{3}$

⑤ $\frac{4}{10} \dots \frac{14}{35}$

⑥ $1 - \frac{10}{15} \dots \frac{2}{3}$

Try by Yourself

① Represent on the number line each of the following rational numbers

① $\frac{1}{3}$ ② $-\frac{7}{4}$ ③ $-\frac{1}{3}$ ④ $1\frac{1}{5}$ ⑤ $-3\frac{1}{2}$

② Compare between

① $\frac{2}{3}$ and $\frac{5}{7}$ ② $\frac{1}{5}$ and $\frac{1}{6}$ ③ $-\frac{8}{15}$ and $-\frac{2}{3}$

④ 0.6 and $\frac{5}{6}$

③ Find two rational numbers lying between

① $\frac{4}{5}$ and $\frac{3}{4}$ ② $\frac{4}{5}$ and $\frac{5}{6}$ ③ $\frac{4}{5}$ and 0.7 ④ $\frac{3}{4}$, 2

④ Represent the rational numbers: 2 , $-\frac{5}{2}$, $\frac{7}{2}$, 0 , -1 on the number line then arrange them ascendingly

Adding and Subtracting Rational Numbers

① Adding two rational numbers having the same denominator:

If $\frac{a}{b}$ and $\frac{c}{b}$ are two rational numbers

then:

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$$

② Adding two rational numbers with different denominators:

If $\frac{a}{b}$ and $\frac{c}{d}$ are two rational numbers

then:

$$\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$$

Example ① Add:

$$① \quad \frac{1}{5} + \frac{2}{5} = \frac{1+2}{5} = \frac{3}{5}$$

$$② \quad \frac{5}{6} + \left(-\frac{1}{6}\right) = \frac{5-1}{6} = \frac{4}{6} = \frac{2}{3} \quad (\div 2)$$

$$③ \quad \frac{7}{8} + \left(-\frac{5}{8}\right) = \frac{7-5}{8} = \frac{2}{8} = \frac{1}{4} \quad (\div 2)$$

$$④ \quad -\frac{1}{4} + \frac{3}{4} = \frac{-1+3}{4} = \frac{2}{4} = \frac{1}{2} \quad (\div 2)$$

$$⑤ \quad \frac{5}{9} + \left(-\frac{2}{9}\right) = \frac{5-2}{9} = \frac{3}{9} = \frac{1}{3} \quad (\div 3)$$

$$⑥ \quad -\frac{2}{3} + \left(-\frac{1}{3}\right) = \frac{-2-1}{3} = \frac{-3}{3} = -1$$

properties of addition operation in \mathbb{Q} :

① Closure property:

The sum of any two rational numbers is a rational number.

If $\frac{a}{b}, \frac{c}{d} \in \mathbb{Q}$ then

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + cb}{bd} \in \mathbb{Q}$$

② Commutative property:

If: $\frac{a}{b}$ and $\frac{c}{d}$ are two rational numbers, then:

$$\frac{a}{b} + \frac{c}{d} = \frac{c}{d} + \frac{a}{b}$$

③ Associative property:

If: $\frac{a}{b}, \frac{c}{d}$ and $\frac{e}{f}$ are three rational numbers, then:

$$\left(\frac{a}{b} + \frac{c}{d}\right) + \frac{e}{f} = \frac{a}{b} + \left(\frac{c}{d} + \frac{e}{f}\right) = \frac{a}{b} + \frac{c}{d} + \frac{e}{f}$$

④ The existence of identity element property

in addition:

Zero is the identity element in addition operation

in \mathbb{Q}

$$\frac{a}{b} + \text{Zero} = \text{Zero} + \frac{a}{b} = \frac{a}{b}$$

Ex: Write the addition property which used in each of the following

$$\textcircled{1} \frac{7}{2} + \frac{9}{16} = \frac{9}{16} + \frac{7}{2} \quad \textcircled{2} \text{Zero} + \frac{3}{4} = \frac{3}{4}$$

$$\textcircled{3} \left(\frac{2}{3} + \frac{1}{3} \right) + \frac{1}{6} = \frac{2}{3} + \left(\frac{1}{3} + \frac{1}{6} \right)$$

$$\textcircled{4} \frac{3}{4} + \left(-\frac{3}{4} \right) = \text{Zero} \quad \textcircled{5} \frac{5}{8} + \text{Zero} = \frac{5}{8}$$

Secend: Subtraction operation:

If $\frac{a}{b}$ and $\frac{c}{d}$ are two rational numbers, then

$$\frac{a}{b} - \frac{c}{d} = \frac{a}{b} + \left(-\frac{c}{d} \right)$$

i.e. The subtraction operation in \mathbb{Q} is defined as adding the minuend $\left(\frac{a}{b} \right)$ to the additive inverse of the subtrahend $\left(\frac{c}{d} \right)$

Ex: If $a = \frac{3}{4}$, $b = -\frac{5}{2}$ and $c = \frac{1}{2}$ find the numerical value of each of:

① $a - b$

② $(a + b) - c$

Solution

$$\textcircled{1} \quad a - b = \frac{3}{4} - (-\frac{5}{2}) = \frac{3}{4} + \frac{5}{2}$$

$$(2) (a+b) - c$$

$$= \left(\frac{3}{4} + \frac{-5}{2} \right) - \frac{1}{2}$$

$$= \left(\frac{6-20}{8} \right) - 1/2$$

$$= -\frac{14}{8} - \frac{1}{2} = -\frac{7}{4} - \frac{1}{2} = \frac{-14-4}{8} = \frac{-18}{8} = \frac{-9}{4}$$

$$\frac{b}{a} \times \frac{a}{b} = 1$$

the multiplicative inverse property

Ex: Complete

- ① The multiplicative inverse of the number $\frac{3}{4}$ is ...
- ② The multiplicative inverse of the number -5 is ...
- ③ The multiplicative inverse of the number 0.5 is ...
- ④ The multiplicative inverse of the number $2\frac{1}{2}$...
- ⑤ The multiplicative inverse of the number $(-\frac{2}{3})^{\text{zero}}$...
- ⑥ The multiplicative inverse of the number -1 is ...

Remarks

- ① The multiplicative inverse of the rational number is called the reciprocal of the rational number
- ② Zero has no multiplicative inverse
- $\frac{1}{0}$ is meaningless
- ③ multiplying any rational number by zero equals zero

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$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

$$\textcircled{1} \frac{1}{2} \div \frac{3}{5} = \frac{1}{2} \times \frac{5}{3} = \frac{1 \times 5}{2 \times 3} = \frac{5}{6}$$

$$\textcircled{2} \quad -\frac{3}{5} \div \frac{0}{5} = -\frac{3}{5} \times \frac{5}{0} = \frac{-15}{0} = -\frac{1}{0}$$

$$\textcircled{3} \quad -\frac{14}{15} \div \left(-\frac{21}{5}\right) = -\frac{14}{15} \times \frac{-5}{21} = \frac{2}{3} \times \frac{1}{3} = \frac{2}{9}$$

④ $2\frac{1}{4} \div 1\frac{1}{2} = \frac{9}{4} \div \frac{3}{2} = \frac{9}{4} \times \frac{2}{3} = \frac{18}{12} = \frac{3}{2}$

$$\textcircled{1} \frac{5}{7} \times x = \frac{5}{7}$$

$$\textcircled{2} \quad x \times \frac{17}{3} = 1$$

③ $-\frac{7}{3} \times x = \text{zero}$

④ $-\frac{7}{3} \times -\frac{3}{7} = x$

$$(5) \frac{3}{5} \times x = -\frac{4}{5} \times \frac{3}{5}$$

$$(8) \frac{3}{4} \div x = \frac{3}{4} \times -\frac{2}{5}$$

Ex: Find a rational number lying at one fourth of the way between $\frac{1}{2}$, $\frac{1}{3}$

Solution

$$\frac{1}{2}, \frac{1}{3} \rightarrow \frac{3}{6}, \frac{2}{6}$$

The distance = $|1\frac{3}{6} - 2\frac{1}{6}| = \frac{1}{6}$

The required number is

the smaller number + by distance

$$= \frac{2}{6} + \frac{1}{4} \times \frac{1}{6}$$

$$= \frac{2}{6} + \frac{1}{24} = \frac{8+1}{24} = \frac{9}{24} = \frac{3}{8}$$

Ex: Find a rational number lying at one fifth of the way between $\frac{2}{5}$ and $\frac{4}{7}$

Solution $\frac{2}{5}, \frac{4}{7} \Rightarrow \frac{14}{35}, \frac{20}{35}$

the distance = $\left| \frac{20}{35} - \frac{14}{35} \right| = \frac{6}{35}$

the required number =

the smaller number, $\frac{1}{5}$ distance

$$= \frac{14}{35} + \frac{1}{5} \times \frac{6}{35} = \frac{14}{35} + \frac{6}{175} = \frac{70+6}{175} = \frac{76}{175}$$